AMD ATI Radeon HD 5970 | Asus P7P55D-E Premium | OCZ Technology Colossus 256GB

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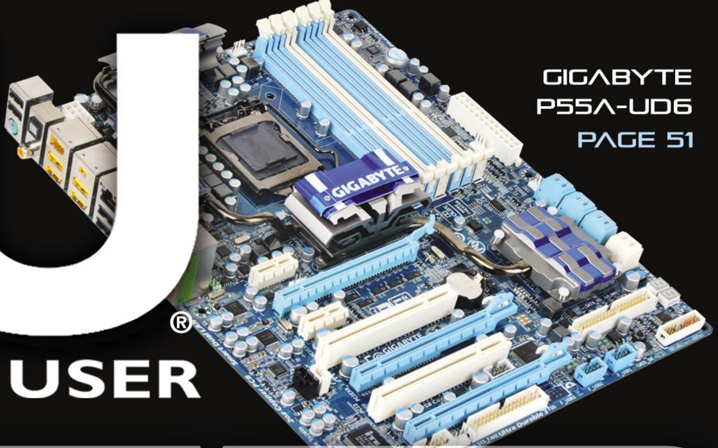

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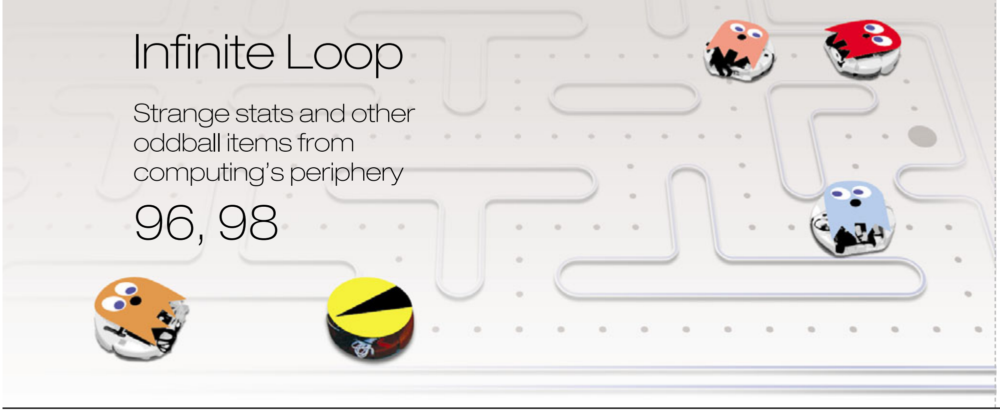

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EDITOR'S NOTE

Happy New Year!

It's true that by some metrics 2009 wasn't exactly a banner year, but for those of us who measure progress in GHz, FLOPS, and terabytes, it wasn't half bad.

Intel's excellent Core i7 and, more recently, Core i5 CPUs kept things interesting on the CPU front; AMD's ATI Radeon HD 5870 took the graphics card market by storm, making the battle for high-end graphics a two-pony race again; and SSDs continued to get bigger, faster, and cheaper.

Nvidia's Ion platform gave tiny computers the oomph needed to play high-def video and do some gaming, DDR3 came of age and became practical as well as powerful, and Microsoft successfully launched a worthy successor to Windows XP, awkward and painful launch party videos notwithstanding.

In retrospect, it's not too great a stretch to say that 2009 was a *fantastic* year for PC fans. As such, we had a good time putting together our annual Best Of awards section, which picks the year's top entries in several categories of components, peripherals, and software; check it out starting on page 48 and let us know what you think.

The best part? By all indications, the stage is set for 2010 to be even better. We are on the cusp of a wave of hexa-core CPUs, even more advanced GPU technology (you can get a little advance intel on Nvidia's Fermi architecture on page 44), and some very interesting new chips that contain a CPU and a GPU on a single die. And don't forget about SATA 6Gpbs and USB 3.0. For a little more detail on what you can expect to see in the coming months, head to page 68.

Yep, there's a lot of very cool stuff headed your way, and as always, we'll be here bringing you the latest information and analysis. So grab a cup of eggnog and enjoy the issue, and thanks for reading.

Chris Trumble, Publication Editor, *CPU*

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CPU

Gotcha.
Here it is.

LIMITLESS IMAGINATION

Introducing the all new chassis line from NZXT, the Beta EVO, M59 and the Lexa S. These new cases showcase a blend of extreme, sleek and traditional design, yet still giving our customers the best balance in price versus performance. All of these are fitted with black interiors, cable management systems, two 140mm top exhausts, and bottom mounted PSU.

Keep cool this winter with the new Sentry 2 temperature display. This latest addition to NZXT's temperature displays sports a touch screen with support for 5 fans up to 10 watts per channel. It is a cool addition to any chassis.

Let your imagination flow this winter, and build your next PC with NZXT.

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What's Happening • Hardware

Compiled by Blaine Flamig

Mice Of A Different Tail

Here's a tale of three new and highly divergent mice. First, we have Razer's Abyssus ($49.99), a 3,500dpi infrared gaming mouse that has the audacity to sport a mere two buttons. Don't be fooled, though; the Abyssus' minimalistic exterior still provides "ultra-responsive buttons tuned for maximum tactile feedback" and toggling between multiple dpi and polling rate settings. Second, there's WarMouse's OOMouse ($74.99), which dons no fewer than 18 buttons and an analog joystick. Why 18? To support 52 key commands, of course. Further, OOMouse has default modes for five primary OpenOffice.org apps, as well as Photoshop, GIMP, WoW, Call of Duty, and others. Finally, meet SmartFish Technologies' wireless ErgoMotion Laser Mouse ($49.95), which literally rocks, swivels, and pivots on a patented base with the intention to reduce RSIs. ▲

Imation Does Wireless USB Drive; Buffalo Does USB 3.0

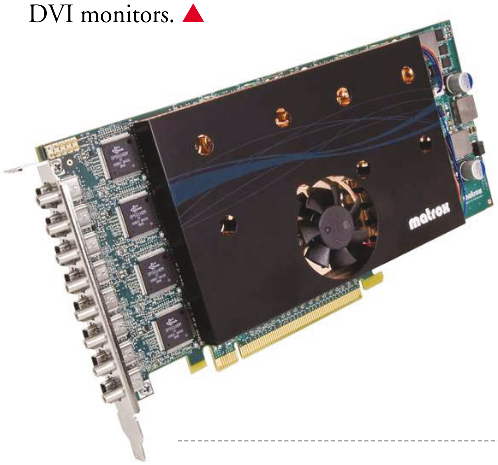
Fresh out of USB ports but need external storage always at the ready? Try Imation's new 1.5TB (300,000 photos or 750 hours of video) Pro WX on for size. The "world's first wireless USB external hard drive" connects up to 30 feet away with up to 15MBps throughput. Slow? Yes, but did we mention that it's wireless? For $449.99 you get a stand (vertical or horizontal), sleep mode, one-touch backups, and PC and Mac compatibility. But if you have an open USB port just begging for action, Tyme Machines' new "Star Wars" flash drives come in 3-inch, 4 to 16GB ($29.99 to $59.99) Darth Vader, Boba Fett, Storm Trooper, and Yoda versions. Finally, Buffalo Technology is bringing USB 3.0 to the masses in the form of its DriveStation HD-HXU3 ($199.99 to $399.99; 1TB to 2TB). The drive is backward-compatible with all USB 2.0 systems, but Buffalo is also selling its own two-port PCI-E USB 3.0 IFC-PCIE2U3 card (estimated at $60). ▲

"Productivity Maximizing/Battery Lifetime Extending Tool"

Notebook stands are a dime a dozen, right? Not quite. AViiQ believes it has added a twist with its 5.5-ounce Portable Laptop Stand ($79.95), which accommodates all laptop sizes. Beyond visibility and screen-glare improvements, AViiQ says its stand's 12-degree incline promotes ergonomically ideal usage and moves heat on its merry way. Further, the stand folds down to just a quarter-inch thick. "We developed a feature scope that defined what an iconic user would want in a laptop stand," stated designer Cezanne Farris-Gilbert. "Then we worked through a myriad of variants before finding a solution that satisfied all the features we wanted the stand to have." The stand consists of four aluminum plates made of an aluminum composite material called Hylite that AViiQ bonds to a polypropylene core. ▲

Matrox Dishes Up Octal Graphics

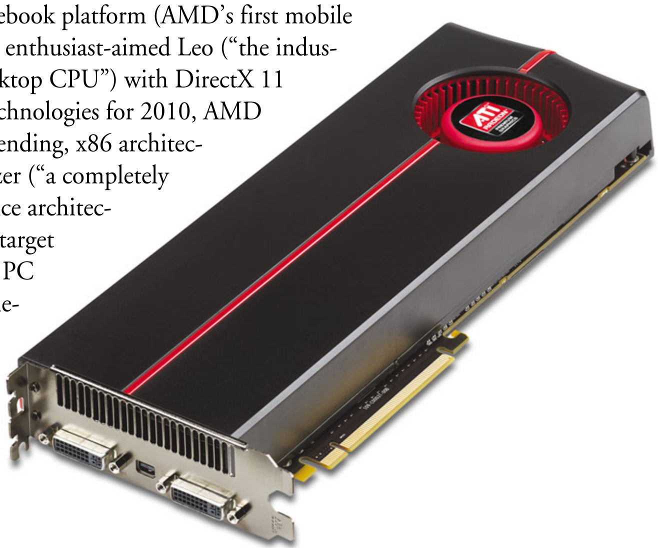
By chance, are you in need of single-slot PCI-E x16 graphics card capable of driving an octet of displays? If so, Matrox says its M9188 is the world's first to tout such a trait. Beyond 2GB of memory, the M9188 supports eight DisplayPort or DVI Single-Link outputs from one workstation at 2,560 x 1,600 each. And it supports individual and stretched desktop modes. So, what would you use this $1,995 monster for anyway? "The expansive multimonitor configuration allows system operators to accurately manage energy grids or train dispatch applications while ensuring maximum performance across all displays," states Matrox's Business Development Manager Ron Berty. Less expensive is a $259 M9128 version with 1GB of memory and support for two DisplayPort or single-link DVI monitors. ▲



AMD & Intel Chips Aplenty

Somehow, while releasing the "fastest card ever created" by way of the dual-GPU ATI Radeon HD 5970 and powering the Cray XT5 "Jaguar" supercomputer—newly crowned the world's fastest—with 37,376 hexa-core Opterons, AMD managed to announce its chip plans through 2011. Beyond the new Danube notebook platform (AMD's first mobile quad-core chips) and enthusiast-aimed Leo ("the industry's first six-core desktop CPU") with DirectX 11 and ATI Eyefinity technologies for 2010, AMD spoke on the 2011-pending, x86 architecture-bending Bulldozer ("a completely new, high-performance architecture"), Bobcat ("will target low-power, ultrathin PC markets"), and mobile-centric Fusion family that will combine CPU and graphics power.

Meanwhile, while Intel was agreeing to fork over $1.25 billion to settle antitrust allegations from AMD and fending off similar accusations from Nvidia—"Intel's tactics with Ion have been the most aggressive we've seen from a competitor" and "We'll keep growing as a company, but further action needs to be taken to protect consumers" from CEO Jen-Hsun Huang—various reports touted Pineview chips, including the Atom N450, from the Pine Trail platform showing up in netbooks in early 2010. Elsewhere, 32nm Atom-based Cedar View chips based on the Cedar Trail platform, complete with DirectX 10.1 3D graphics, HD playback, and dual-display support and a DDR3 memory controller, are slated for 2011. Elsewhere, Polish Web site PClab.pl put a pre-release six-core 2.86GHz 32nm "Gulftown" i9 chip through the paces, reportedly demonstrating a 50% boost in video encoding and 3D modeling over a current Core i7. ▲



Old CDs/DVDs = New iPod/iPhone

Have a crate of CDs or DVDs collecting dust in your basement? iPodMeister will take them off your hands and gift you a new iPod or iPhone (3GS models included) in return. Just ship your old discs to the company and you'll receive a check (plus sales tax if applicable) to apply toward a shiny new, fully warranted player for the effort. iPodMeister will even pick up the discs and pay for shipping. Too good to be true? You're encouraged to email or call to clear any doubts, although plenty of national press coverage would suggest iPodMeister is bona fide. Scoring a 32GB iPhone 3GS with GPS and video will cost you 350 pristine discs—no visible scratches or marks, complete cover art, and original jewel case, thank you. ▲

Compiled by Blaine Flamig

Who's Funding Web Sites? Probably Not You

Picture yourself in a room with 99 others all Web surfing. According to recent data that Chitika, a search-based online advertising network, conducted in October, of those in the room, only two of you are likely to click ads that help fund Web sites. During a two-week stretch, Chitika monitored a sample of roughly 87 million anonymous surfers using its 60,000-plus publisher network. Only 1.86 million actually clicked an ad at least once. That's a measly 2.15% if you're keeping track at home. Despite the paltry percentage, Chitika positively spins the results by pointing out "the vast business potential that remains untapped for Web site owners and advertisers alike." ▲

The Webby Awards Remembers The 2000s

The International Academy of Digital Arts and Sciences won't announce the 2009 winners of its 14th annual Webby Awards until June 2010. In the meantime, the organization recently looked back at the decade that was by naming its 10 most influential Internet moments. David-Michel Davies, Webby Awards' executive director, stated the recurring theme among the list's milestones is "the Internet's capacity to circumvent old systems and put more power into the hands of ordinary people." List-makers numbered Craigslist stretching outside of San Francisco (2000), Google launching AdWords (2000), Wikipedia hitting the scene (2001), Napster bidding adieu (2001), Google's IPO (2004), the online video explosion (2006), Facebook and Twitter taking shape (2006), the debut of the iPhone (2007), 2008's U.S. presidential campaign, and the Iranian election protests of 2009. ▲

"Hacking The Cable Modem"

Ryan Harris, aka DerEngel, is facing 20 years in prison and $250,000 in fines following a Nov. 2 indictment on six counts of federal conspiracy, wire fraud, and computer fraud. Harris is also the author of the September 2006-released "Hacking The Cable Modem." Now, whether Harris' editor Bill Pollock is merely looking to sell more copies we'll leave up to you, but following Harris' indictment, Pollock stated, "Hacking is not evil. And hacking hardware that one owns is not and should not be illegal. Stealing service is clearly illegal, but neither DerEngel nor his book condones theft of service." No Starch Press, also the publisher of Andrew Huang's "Hacking The Xbox," stated that "Hacking The Cable Modem" is currently sold out, though reprints are in the works. Summing up No Starch Press' support, Pollock stated, "I don't like black boxes, and I like to play with hardware. This is a book about reverse engineering hardware—a protected right in the United States." You be the judge. ▲

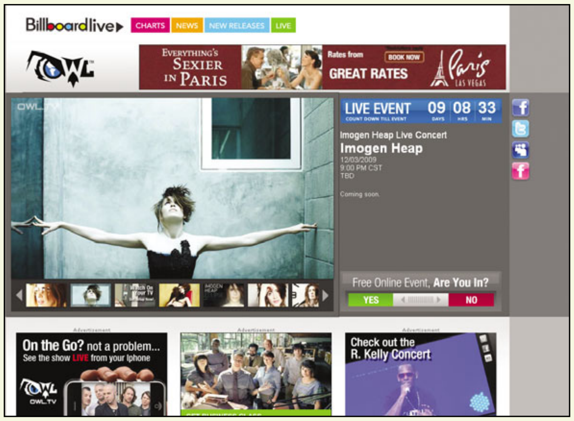
SITE SEEING

All Things Awesome

Appreciate what you have. Stop and smell the roses. Live each moment like it's your last. Cherish the small things. Chances are you've thrown out such sage advice plenty of times, but how many of us really practice what we preach? Make a daily pit stop at the wonderfully innocent, heartwarming, and justifiably popular 1000 Awesome Things blog (1000awesomethings.com) from Neil Pasricha and you just might. Simply put, the site is "just a time-ticking countdown of 1,000 awesome things" that will eventually wind up in a book expected for an April 2010 release. Allow yourself to temporarily push aside life's responsibilities, drudgery, and seemingly omnipresent pessimism, however, and such entries as "The sound of steaks hitting a hot grill," "The moment at a concert when the crowd figures out what song they're playing," and "Placing the last piece of the puzzle" will have you feeling warm and fuzzy all over in no time. ▲

Billboard Goes Live With Concerts

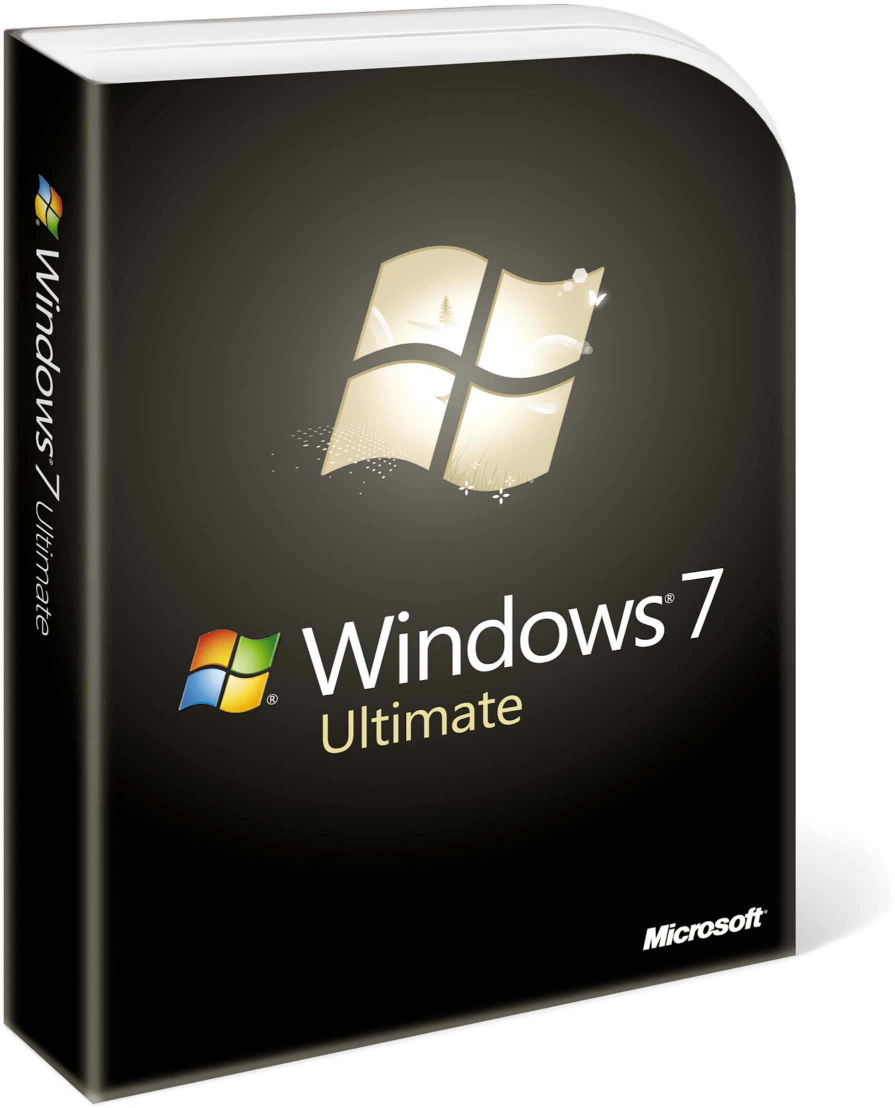
If there are two things we love, it's free music (legal, of course) and live concerts. Billboard's new Billboard Live (live.billboard.com) combines both aspects into one Web-centric mix, giving viewers full concerts for viewing, complete with multiple camera angles. Billboard is touting the site as a means of "reconnecting artists with their fans for free." Naturally, no live concert Webcast experience would be complete without Facebook and Twitter integration. Further, Billboard Live does iPhone owners proud with an available app. By now, complete shows from R. Kelly, Imogen Heap, and David Archuleta should be available on demand, while live gigs from Alicia Keys, Usher, and others are slated for streaming in January. ▲



Compiled by Blaine Flamig

Windows 7 Is Doing Just Fine, Thank You

As of this writing, we're roughly a month into the Windows 7 era, and Microsoft CEO Steve Ballmer recently hailed the OS as the "best PC operating system" Microsoft or anyone has ever built. He also told shareholders Win7 sold double the number in the initial weeks as Vista did in the same time period, characterizing Win7's initial reception as "fantastic." Although Ballmer didn't detail exact sales numbers, Vista sold roughly 20 million copies in its first month of release. Looking ahead, various reports citing roadmaps detailed at Microsoft's mid-November Professional Developer's Conference say we can expect Windows 8 in 2012, possibly in a 128-bit version. ▲

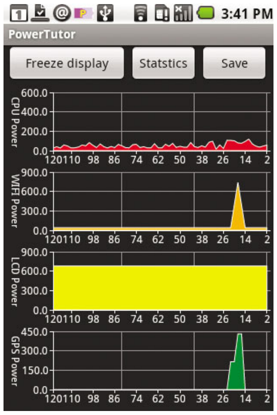


So-So Reaction To Google Chrome OS

Google gave geeks worldwide a glimpse of its much-hyped, netbook-centric Chrome OS in San Francisco in mid-November, and the overall reaction was, well, less than glowing. Seemingly, everyone from tech journalists to Microsoft and Phoenix Technologies execs had something negative to say about the open-source OS, including calling it nothing more than the Chrome Web browser with extensions added on. Jim Zemlin, The Linux Foundation executive director, however, went the other direction, saying, "What's good for Chrome is good for Moblin, and what's good for Moblin is good for Chrome." Canonical's Chris Kenyon meanwhile, blogged that "In the interest of transparency, we should declare that Canonical is contributing engineering to Google under contract." He later added that for 2010, in addition to "delivering Ubuntu experiences," Canonical will be "working with Google on Chrome OS-based devices." User interest, meanwhile, was apparently plentiful, as reports stated that compiled, ready-to-use downloads were quite popular at BitTorrent sites. ▲

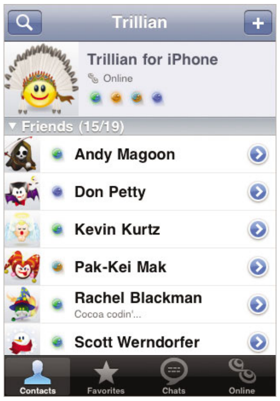
SOFTWARE SHORTS

Apps The Android Way



The free PowerTutor app that University of Michigan doctoral students developed for Android-friendly smartphones is pretty nifty in a power-usage sort of way. Essentially, PowerTutor gifts developers with the ability to create more power-efficient products and let users "compare the power consumption of different applications and select the leanest version that performs the desired task." The app's handiness extends to seeing exactly how executed actions influence battery life. PowerTutor works by monitoring in real time how a device's screen, network interface, GPS receiver, and processor use power. "Today, we expect our phones to realize more and more functions, and we also expect their batteries to last," stated Lide Zhang, one of the students who helped develop the app. "PowerTutor will help make that possible." ▲

Game Developer: iPhone Tops Android



Sticking on the mobile front, a mid-November Reuters' article reported that not only will French mobile gaming company Gameloft cut back on developing games for the Android platform to pour more investments into iPhone development, other companies will follow suit. Reuters quoted Gameloft Finance Director Alexandre de Rochefort as stating Gameloft is selling 400 times more games for the iPhone than Android devices. Rochefort further stated that the Android app store "is not as neatly done as on the iPhone" and "Google has not been very good to entice customers to actually buy products. On Android nobody is making significant revenue." Yet, just days later, Gameloft pledged its support to develop HD games for second-gen Android phones, with Gameloft's Gonzague de Vallois saying "consumers will benefit from a top-quality gaming experience." For those of you on the iPhone bandwagon, check out Cisco's new, free SIO To Go app, which taps into its Security Intelligence Operations network and allows for customizing security threat alerts. Also, grab the finally approved Trillian for iPhone app ($4.99) for all your IM needs. ▲

WM Recorder 14 On The Flash-Recording Scene

Applian Technologies and All Alex stress their jointly published WM Recorder 14 software, which recently underwent a major upgrade, is 100% legal, as it records "all streaming media not protected by DRM and is fully compliant with all copyright laws, including the Digital Millennium Copyright Act." Disclaimer noted, version 14 ($49.95) adds Flash-recording abilities, making the app "the most advanced live and on-demand streaming video recording technology for all of the popular streaming formats." Besides Flash, other support includes recording Windows Media, Real Audio and Video, MPEG, QuickTime, and Shoutcast streams. Beyond previewing, pausing, rewinding, and fast forwarding Flash clips, WM Recorder 14 includes support for scheduling automatic recordings, recording up to 100 radio stations simultaneously "with no loss in quality," Turbo Recording (records streams at 5X speed), and more. ▲

Firefox Heats Up; PS3 Rumors Circulate

If you're a Firefox enthusiast, we have good news and bad news. First the good: Rumors have it that Sony recently held a confab with Mozilla, and although details were essentially nonexistent, one possibility being thrown about is Sony porting Firefox to the PS3, which many a PS3 owner would consider a significant improvement over the console's current integrated browser. Now the bad news: In late-November, online coverage concerning an article on a Mozilla Firefox support page titled "Firefox Consumes A Lot Of CPU Resources" began picking up steam. According to the article, "At times, Firefox may require significant CPU resources in order to download, process, and display Web content." Possible culprits listed include Flash (see the FlashBlock add-on for a remedy), Adobe Reader (configure Firefox to open PDFs outside Firefox), and JavaScript (use the NoScript add-on for relief). ▲

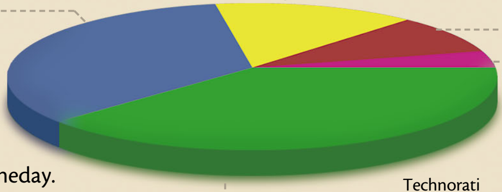
Job Of The Month

If you still think that the Xbox 360 or your Nintendo DS has the most popular games on the planet, then you haven't been to Facebook lately. Millions of people have made a game of cooking dishes in Café World or sowing rows of produce in Farmville. Social media game company Zynga is the new hot thing in Silicon Valley, and it is hiring scores of new people to execute these casual MMO titles. Zynga is looking for a Chief Technology Officer spot (only major players need apply) as well as a Systems Game Designer who can add and adjust these real-time MMOs on the fly. You will need strong math and Excel skills for this one as well as a firm background in game design. But Zynga clearly is the place to work right now, as it offers full benefits and company-provided lunch and dinner every day. In fact, the company is also looking to hire its own cooks and banquet servers. Just like Google in the old days. Yum.

www.zynga.com/jobs

Will Blog For Bucks

According to the latest State of the Blogosphere report from Technorati, about 86% of bloggers are either part-time posters or self-employed. When Technorati asked this group why they blogged, respondents were evenly divided over doing it for fun or some profit.



34% - I blog for fun and do not plan to make money on it.

15% - I use my blog to supplement my income, but it's not a full-time job.

9% - I blog full-time for my own company or organization.

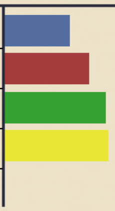
38% - I blog for fun but would like to make money on it someday.

4% - I blog full-time for a company or organization.

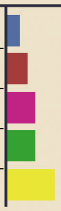
Technorati

Twitter Rising, Social Nets Leveling

Between April and September 2009, the share of Internet users on Twitter rose markedly, while overall social network use seemed to be stabilizing after a year of meteoric growth.



Social Network Sites	
Aug. 2008	29%
Nov. 2008	37%
April 2009	46%
Sept. 2009	47%



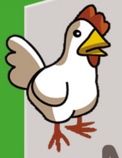
Twitter	
Aug. 2008	6%
Nov. 2008	9%
Dec. 2008	11%
April 2009	11%
Sept. 2009	19%

Pew Internet & American Life Project

250,000 IT Jobs Lost in a Year

Technology has not been immune to the downturn, with the IT segment shedding nearly a quarter of a million jobs between November 2008 and November 2009, according to TechServe Alliance, an IT staffing analysis firm. And yet, there are positive signs that the market may be stabilizing for techies. TechServe also reports that in September, only 1,100 IT positions had been lost, suggesting that companies may have found a bottom in their tech department rolls. And rarely has the IT pay scale been this volatile, reports Foote Partners. In the third quarter of 2009, 39% of specialized tech skills either lost or gained value to their employers who pay their workers extra for specific skills training. The research firm says this number suggests that IT employers are carefully adjusting their pay scales in relation to skill sets in the market.

TechServe Alliance and Foote Partners



RAW Numbers

Market Share Edition

57.08%

Internet Explorer's worldwide share of browser market as of November 2009

StatCounter

73.8%

Apple iPod's share of portable music player market, September 2009

Apple

50x

The number of mobile Google searches that come from the iPhone compared to any other mobile device

Google

79.1%

Percent of 18-to-34-year-olds reached by broadcast and satellite radio each day

Nielsen

Windows®. Life without Walls™, CyberPower recommends Windows 7

CyberPOWER Inc.

UNLEASH the power

Your Unlimited Gaming Solutions

$855

Gamer Xtreme 2000

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

i7-870 2.93Ghz	$ 1249
i7-860 2.80Ghz	$ 935

Intel® Core™ i5 Processor

i5-750 2.66Ghz	$ 855

Asus® Intel® P55 Chipset MB
Genuine Windows 7 Home Premium 64 Bit Edition
Corsair® 4GB DDR3 1333 Dual Channel Memory
1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
NVIDIA® GeForce® GT 240 1GB DDR3
Nzxt M59 Gaming Tower Case w/ 600 W Power Supply

System included the following

24X±RW
HD 7.1 600 W
Xtreme Gear®
Xtreme Gear®
FREE 802.11G

$765

Gamer Xtreme 1000

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

i7-870 2.93Ghz	$ 1155
i7-860 2.80Ghz	$ 849

Intel® Core™ i5 Processor

i5-750 2.66Ghz	$ 765

Asus® Intel® P55 Chipset MB
Genuine Windows 7 Home Premium 64 Bit Edition
Corsair® 4GB DDR3-1333 Dual Channel Memory
500 GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
NVIDIA® GeForce® GT 220 1GB
Apevia X-Crusier 2 Gaming case with 3 Meters and Controls 420 Watt Power Supply

System included the following

24X±RW
HD 7.1 600 W
Xtreme Gear®
Xtreme Gear®
FREE 802.11G

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www.cyberpowerpc.com

PC GAMER EDITORS' CHOICE

$1415

Gamer Infinity 8800 Pro SE

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

Extreme i7-975 3.33Ghz	$ 2165
i7-960 3.20Ghz	$ 1705
i7-920 2.66Ghz	$ 1415

Asus® P6T SE Intel X58 Chipset MB
Genuine Windows 7 Home Premium 64 Bit Edition
Corsair® 6GB DDR3-1333 Tri Channel Memory
1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
ATI Radeon™ 5870 1GB Direct X 11 Video
Inwin Maelstrom Full Tower Case 800 Watt Power
Asetek Liquid Cooling System

System included the following

4X Blu-ray Player · 24X±RW · HD 7.1 600 W · Xtreme Gear® · Xtreme Gear® · FREE 802.11G

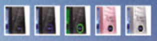
intel® CORE™ i7 inside™
Look for Intel Inside®

$1059

Gamer Infinity HD 5750

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

Extreme i7-975 3.33Ghz	$ 1855
i7-960 3.20Ghz	$ 1375
i7-920 2.66Ghz	$ 1059



Gigabyte Intel® X58 Chipset MB Supporting CrossFireX™/SLI™
Genuine Windows 7 Home Premium 64 Bit Edition
Corsair® 6GB DDR3-1333 Tri Channel Memory
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
ATI Radeon™ HD5750 1GB
Apevia X-Dreamer 3 Gaming Case / 600 Watt Crossfire™ Power

System included the following

24X±RW · HD 7.1 600 W · Xtreme Gear® · Xtreme Gear® · FREE 802.11G

$615

Gamer Infinity 8000 Dream

Intel® Core™ 2 Duo Processor

(12MB Cache, 1333Mhz FSB)	
Quad Q9650 3.00Ghz	$ 839
Quad Q9550 2.83Ghz	$ 725
Quad Q9400 2.66Ghz	$ 695
(8MB Cache, 1066Mhz FSB)	
Quad Q8400 2.66Ghz	$ 675
Quad Q8300 2.40Ghz	$ 649
(6MB Cache, 1333Mhz FSB)	
E8500 3.00Ghz	$ 695
E8400 2.83Ghz	$ 669
E7500 2.80Ghz	$ 615

Intel G41 Chipset Motherboard
Genuine Windows 7 Home Premium 64 Bit Edition
Corsair® 4GB DDR3-1333 Dual Channel Memory
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
NVIDIA® GeForce® GT 220 1GB Video
Cooler Master Elite 310 Gaming Case 420 Watt

System included the following

24X±RW · HD 7.1 600 W · Xtreme Gear® · Xtreme Gear® · FREE 802.11G

$895

Intel® Centrino® 2 Technology
- Intel® Core™ 2 Duo Processor
- Intel® PM45 Chipset
- Intel® WiFi Link 5300 802.11 A/G/N

Gamer Xplorer X5-7800

Intel® Core™ 2 Duo Processor
(1066Mhz FSB)

T9900 6MB L2 Cache, 2.93Ghz	$ 1255
P9700 6MB L2 Cache, 2.80Ghz	$ 1055
T9600 6MB L2 Cache, 2.66Ghz	$ 1019
P8800 3MB L2 Cache, 2.53Ghz	$ 945
P8700 3MB L2 Cache, 2.40Ghz	$ 895

Genuine Windows 7 Home Premium 64 Bit Edition
4GB DDR3 PC1333 Memory
320GB SATA150 Hard Drive
15.6" WXGA TFT Display 1366x768 pixels
8X DVD+/-RW Drive
1000/100/10 Network Card & 56K V.92 Fax/Modem
ATI Mobile Radeon™ 4650 512MB
3-in-1 Built-in Media Reader
1 HDMI Port, 1 IEEE-1394 Firewire Port
3x USB 2.0 Ports, 1 PCMCIA Type II Slot
3 Hours Battery Life, Weight only 6.8 Lbs
Free Carrying Case, 6 Custom Colors to Choose From

$1009

Intel® Centrino® 2 Technology
- Intel® Core™ 2 Duo Processor
- Intel® PM45 Chipset
- Intel® WiFi Link 5300 802.11 A/G/N

Gamer Xplorer X7-7500

Intel® Core™ 2 Duo Processor
(800Mhz FSB)

T9900 6MB L2 Cache, 2.93Ghz	$ 1375
P9700 6MB L2 Cache, 2.80Ghz	$ 1169
T9600 6MB L2 Cache, 2.66Ghz	$ 1135
P8800 3MB L2 Cache, 2.53Ghz	$ 1055
P8700 3MB L2 Cache, 2.40Ghz	$ 1009

Genuine Windows 7 Home Premium 64 Bit Edition
4GB DDR-3 PC1333 Memory
500GB SATA150 Hard Drive
17" WXGA TFT Display 1600x1050 pixels
8x DVD+/-RW Drive
1000/100/10 Network & 56K V.92 Fax/Modem
NVIDIA® GeForce® GT130M 512MB DDR3
3-in-1 Built-in Media Reader, 1 HDMI Port, 1 Firewire Port
IEEE-1394 & 3x USB 2.0 Ports, 1 PCMCIA Type II Slot
3 Hours Battery Life, Weight only 7.6 Lbs
Free Carrying Case

All Desktop systems come with 3 year Limited Warranty + lifetime toll free techsupport

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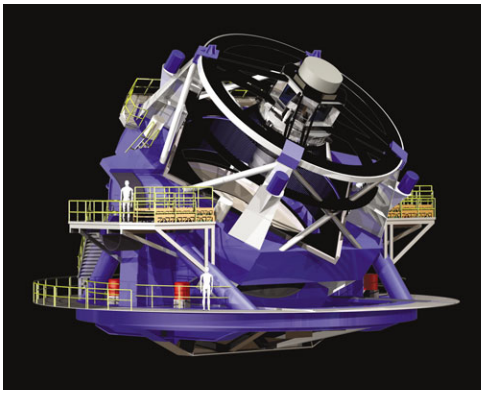
CyberPOWER Inc.

DREAM HARDWARE

You can spend a great deal of money in pursuit of things that are hard to see. Or, should the weather cooperate, you can take your operating system for a nice ride in the country.

by Marty Sems

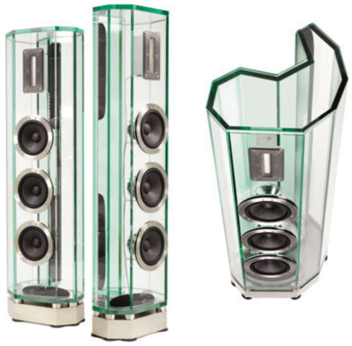
LSST



Had the late Douglas Adams been consulted about the Large Synoptic Survey Telescope's (www.lsst.org) digital camera (he wasn't), he might have said (but didn't), "OK, so 10 out of 10 for resolution, but minus several million for portability, yeah?" Fair enough. It doesn't help that you would have an enormously arduous hike up an 8,800-foot Chilean mountainside to even locate the 3.2-gigapixel sky survey digicam, which knocks the 1.4GP Pan-STARRS (see page 18 in the March 2009 issue) into a cocked hat, or that you would need more friends than you likely have in order to haul off its Vogonesque bulk. The $390 million LSST won't even be ready to capture your blurry thumb, map colossal structures of dark matter, or lop the heads off your mates until at least 2014. And even then, its eventual hundreds of petabytes of photos and database entries will sorely tax the fancy 100-Teraflop data processing system the builders are so proud of. Better for most galactic travelers to settle for something a bit more packable, such as the new 56MP Mamiya DM56 ($32,490; www.mamiya.com). ▲

Image credits: Todd Mason, Mason Productions; LSST Corporation

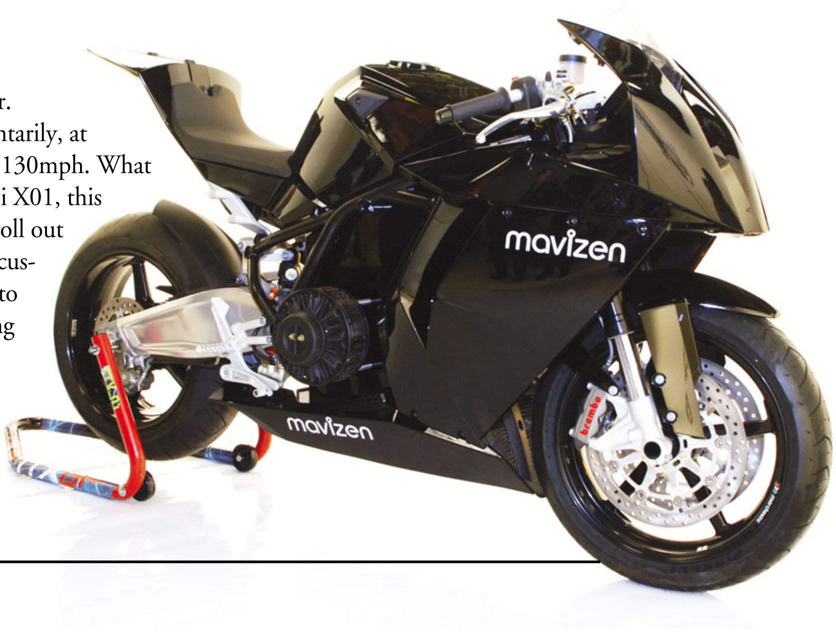
Crystal Cable Arabesque



Probably the first song we'll listen to through our new speakers is Alanis Morissette's "Right Through You." Crystal Cable's revealing foray into speakercraft (www.crystalcable.com) clearly shows the results of a painstaking design process using Comsol modeling software. From its panels of varying widths to the precise dimensions of its friction port, the Arabesque makes the acoustic most of the properties of 3/4-inch thick glass. Scan Speak Illuminator drivers drive, and a RAAL ribbon tweeter tweets. Handcrafted in the Netherlands and Germany, the Arabesque's unique shape makes us think of Neil Sedaka's "comma comma down, dooby-doo down down" chorus. And with such transparent interpretation of the source signal, according to those who should know, a matched set makes breaking up with $65,000 easy to do. ▲

Mavizen TTX02

You've no doubt seen the forum smack talk of fanbois hyping one OS and/or savaging another. Now you're ready to shut them all up—momentarily, at least—with a post such as "My Linux box goes 130mph. What can yours do?" Formerly prototyped as the Agni X01, this electric superbike (www.mavizen.com) should roll out to zero-emission racing types by late March. A custom Linux implementation that boots in three to five seconds controls and/or monitors everything about the bike. A free beta of the OS should be released in April. Oh, and because the $41,800 TTX02 is being born into an interconnected world, you can remotely log in to its Web server and tinker with engine settings over your lunch break. ▲



Dual-Channel Bites Back

Lynnfield-Ready DDR3 Kits, Clocked & Rocked

The launch of Intel's Lynnfield-based Core i5 and Core i7-800 series processors was significant for a number of reasons. The Lynnfield launch not only marked the introduction of more mainstream, Nehalem-based desktop processors but also ushered in a new socket and chipset—LGA-1156 and the single-chip P55 Express, respectively. Lynnfield-based Core i5 and Core i7-800 series processors were also the first to be outfitted with on-die PCI-E connectivity, and they feature more advanced Turbo Mode functionality than the higher-end Bloomfield-based Core i7-900 series (at least currently).

In terms of technology, Intel's Lynnfield-based processors are arguably more advanced than the Core i7-900 series. But Intel trimmed down one aspect of Lynnfield in comparison to its higher-end counterparts: the memory controller. Whereas the Core i7-900 series sports a triple-channel DDR3 memory controller, Core i5 and Core i7-800 series processors have a dual-channel controller. The dual-channel memory controller does afford the Lynnfield-based chips with a higher officially supported memory speed though, 1,333MHz vs. 1,066MHz with Bloomfield (although both processor types will operate with much faster memory speeds with a little tuning).

As was the case when Intel launched the first wave of Core i7 processors, memory manufacturers were at the ready with DDR3 memory kits—dual-channel this time, if you haven't caught on by now—targeted at the Core i5 and Core i7-800 series processors. To be geared for Lynnfield, memory kits must require no more than 1.65V and operate at DDR3-1333 speeds (or higher). Support for Intel's XMP (eXtreme Memory Profiles) is a bonus.

The Combatants

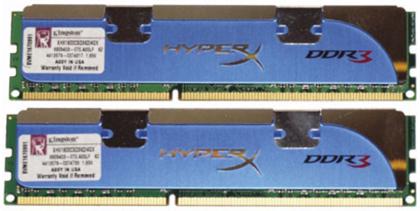
Now that Lynnfield-based processors and compatible P55 Express-based motherboards are widely available, we thought it would be a good time to round up a number of Lynnfield-ready memory kits to find the proverbial "sweet spot" of the market. With that in mind, we've put six dual-channel memory kits with speeds ranging from 1,333MHz on up to a scorching 2,133MHz through their paces to see which one came out on top. A-Data, Corsair, G.Skill, Kingston, and OCZ are represented in this shootout.

As you may expect, considering the wide range of rated frequencies for the memory kits in this roundup, each one has its own unique aesthetic. Long gone are the days of bare, generic-looking, enthusiast-class memory modules. Sure, many value-priced memory kits are bare and hardly distinguishable from one another without a keen eye, but not high-end memory. Virtually all of the well-known memory manufacturers have introduced custom heatsink and heat spreader designs for their high-end kits that clearly distinguish one brand from another. Don't believe us? Just check out the heatsinks Kingston and G.Skill are including on some of their offerings.

Of the six kits that we tested for this article, three featured basic heat spreader designs, while the other three were outfitted with more elaborate heatsinks. Typically, heat spreaders alone are more

HY63I1B16K
$88.99
A-Data
www.adata.com.tw
●●●

Dominator CMD4GX3M2A1600C8
$94.99
Corsair
www.corsair.com
●●●◖



HyperX KHX1600C8D3K2/4GX
$103.99
Kingston
www.kingston.com
●●●●

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

than adequate for relatively low-voltage memory modules suited for Lynnfield-based systems, but higher-clocked memory can generate somewhat more heat and hence require additional cooling to maintain stability under heavy workloads. Should one of the higher-end kits here appeal to you, be sure to check that you have the necessary clearance between the DIMM slots on your motherboard.

How We Tested

We tested the memory kits represented in this roundup on a system consisting of a P55 Express-based Asus P7P55D-E Premium motherboard, Intel Core i7-860 processor, and Nvidia GeForce GTX 280. We installed our OS of choice, Windows 7 Ultimate 64-bit, on the system's WD Raptor hard drive, and to ensure we had a clean, ample supply of power, a PC Power & Cooling Turbo Cool 1200 supplied the juice to the build.

We made every effort to ensure our test system's processor remained as close to its stock speed of 2.93GHz as possible (disregarding Turbo Mode, which we enabled for the tests), but had to concede a few MHz in some tests to run the memory kits at their rated frequencies. Where possible, we enabled Intel XMP (eXtreme Memory Profiles) to ensure each memory kit was configured to the companies' specifications. And where XMP was not available, we set the memory speeds and timings manually in the BIOS by either selecting the appropriate memory multiplier or using a combination of BLCK (base clock), CPU Multiplier, and memory voltage manipulation. Of the kits we tested here, though, only A-Data's and OCZ's offerings didn't support XMP.

A combination of synthetic tests consisting of the Lavalys' Everest Ultimate Edition Memory and Cache benchmark and SiSoft Sandra 2009 SP2's Memory Bandwidth and Memory Latency benchmarks gave memory kits their workout. We also used a low-resolution Crysis CPU benchmark to assess the overall performance of each memory kit.

A-Data HY63I1B16K

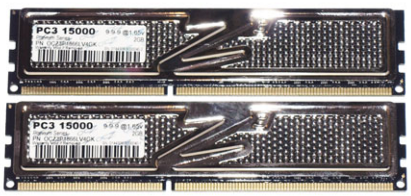
The A-Data HY63I1B16K is what we would consider an entry-level Lynnfield-ready memory kit. The 4GB kit consists of two 2GB DDR3-1333 sticks of RAM. Each stick of memory is outfitted with basic, flat, aluminum heat spreaders with a pinkish anodized coating. Because this kit requires such a low voltage (1.5V) to operate at its rated frequency of 1,333MHz, which is the lowest speed of the bunch, the kit's basic heat spreaders are more than enough to keep the memory running cool.

A-Data's HY63I1B16K memory kit has a CAS latency of 9, which is quite high for a DDR3-1333 kit, and it carries a lifetime warranty. Throughout testing, the A-Data HY63I1B16K kit proved to be perfectly stable and performed well enough, but as the numbers in our performance will show, there's a lot of additional performance to be had by pairing a Core i5 or Core i7-800 series Lynnfield-based CPU with memory faster than 1,333MHz. These sticks will do fine in a budget build, but enthusiasts should spend a few extra bucks for something faster.

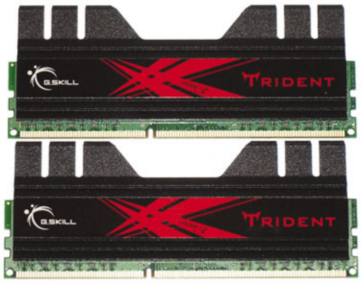
Corsair Dominator CMD4GX3M2A1600C8

Corsair is a company that is well-known to enthusiasts and power users. Corsair's memory modules and, more recently, power supplies and case have consistently ranked amongst the best in the industry. As such, it should come as no surprise that the Corsair Dominator CMD4GX3M2A1600C8 kit is a solid, well-rounded contender.

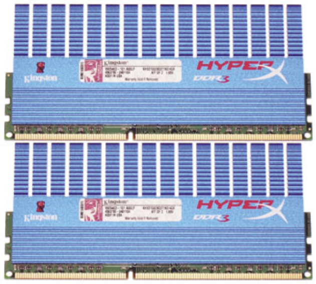
As its name suggests, the Dominator CMD4GX3M2A1600C8 is a 4GB kit, rated for operation at 1,600MHz with a CAS latency of 8. The kit calls for a voltage of 1.65V and features Corsair's DHX (Dualpath Heat eXchange) technology, although the heatsink fins are different from those found on the company's XMS products and don't feature channels that allow air to cool the PCB. As is typically the case with Corsair's memory, the Dominator CMD4GX3M2A1600C8 kit performed well and was perfectly stable. It did, however, finish a touch behind Kingston's HyperX KHX1600C8D3K2/4GX kit, which has similar specs. For



Platinum OCZ3P1866LV4GK
$132.99
OCZ
www.ocztechnology.com
●●●



Trident F3-16000CL9D-4GBTD
$134.99
G.Skill
www.gskill.com
●●●●



HyperX KHX2133C9D3T1K2/4GX
$234.99
Kingston
www.kingston.com
●●●◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

under $95, though, this kit is an excellent option.

Kingston HyperX KHX1600C8D3K2/4GX

The HyperX KHX1600C8D3K2/4GX's branding tells much of the story. The 4GB kit consists of dual 2GB modules, a rated frequency of 1,600MHz, and a CAS latency of 8. The modules' 1.65V operational voltage is in line with Intel's Lynnfield requirements. The modules include Kingston's signature, flat heat spreaders, with a blue anodized coating and raised knurling on the HyperX logo.

It would be easy for this HyperX memory kit to get lost in the mix. The middle-of-the-road price, relatively plain heat spreaders, and somewhat unremarkable (for enthusiast kits) operating frequency might lead you to believe that there's nothing special about this kit. But despite all that, the KHX1600C8D3K2/4GX's strong performance helps it stand out among the competition.

OCZ Platinum OCZ3P1866LV4GK

OCZ's Platinum OCZ3P1866LV4GK memory kit is geared toward Lynnfield overclockers willing to sacrifice a little bit of latency for higher clock speeds. This 4GB kit, like all of the others represented here, is made up of two matched 2GB modules. The Platinum OCZ3P1866LV4GK's rated frequency is 1,866MHz, as its name suggests. It has a CAS latency of 9 and operates at 1.65V.

The Platinum OCZ3P1866LV4GK kit features OCZ's tried-and-true XTC heat spreader design, which is perforated in a honeycomb pattern to allow air to circulate over and through the heat spreaders. This design cools both the memory chips and the PCB beneath. Overall, this kit offered good performance and a nice high clock speed, but it didn't stand out in any category.

G.Skill Trident F3-16000CL9D-4GBTD

Although the company isn't as well-known as some other memory manufacturers here in the United States, G.Skill has actually been around for 20 years, producing products for PC enthusiasts. The Trident F3-16000CL9D-4GBTD kit is a great example of what the company does best—offer high-performance products at competitive prices. For only two dollars more than OCZ's memory kit, the Trident F3-16000CL9D-4GBTD kit sports the same capacity and timings but delivers a higher rated frequency of 2,000MHz and lower voltage requirement of 1.6V. The G.Skill Trident F3-16000CL9D-4GBTD kit is also outfitted with larger, more substantial heatsinks that do a great job of keeping the memory cool.

Although the Trident F3-16000CL9D-4GBTD's performance trailed the higher-clocked Kingston kit overall, G.Skill's offering is priced a full $100 lower, which makes it a relative bargain.

Kingston HyperX KHX2133C9D3T1K2/4GX

Kingston's HyperX KHX2133-C9D3T1K2/4GX is one monster of a

Specifications Side-By-Side

All memory modules are not created equal. Although the six Lynnfield-compatible, dual-channel kits featured here are all the same capacity, they feature differing latencies, rated frequencies, and voltages, along with completely different cooling designs. To make it easier to pick out the differences between the kits, we've listed their model numbers, specifications, prices, and ratings in the chart below. ▲

	A-Data HY63I1B16K	**Corsair Dominator CMD4GX3M2 A1600C8**	**Kingston HyperX KHX1600C8D3 K2/4GX**	**OCZ Platinum OCZ3P1866 LV4GK**	**G.Skill Trident F3-16000C L9D-4GBTD**	**Kingston HyperX KHX2133C9 D3T1K2/4GX**
Price	$88.99	$94.99	$103.99	$132.99	$134.99	$239.99
Capacity	4GB (2 x 2GB)	4GB (2 x 2GB)	4GB (2 x 2GB)	4GB (2 x 2GB)	4GB (2 x 2GB)	4GB (2 x 2GB)
Rated Speed	DDR3-1333 (PC3-10666)	DDR3-1600 (PC3-12800)	DDR3-1600 (PC3-12800)	DDR3-1866 (PC3-15000)	DDR3-2000 (PC3-16000)	DDR3-2133 (PC3-17066)
CAS Latency	9	8	8	9	9	9
Timings (CAS, RAS to CAS, Row Precharge, Row Active Delay)	9-9-9-24	8-8-8-24	8-8-8-27	9-9-9-27	9-9-9-27	9-9-9-27
Voltage	1.5V	1.65V	1.65V	1.65V	1.6V	1.65V
ECC Support	No	No	No	No	No	No
Buffered / Registered	Unbuffered	Unbuffered	Unbuffered	Unbuffered	Unbuffered	Unbuffered
Cooling	Heat spreaders	Heatsinks	Heat spreaders	Heat spreaders	Heatsinks	Heatsinks
Intel XMP Ready	No	Yes	Yes	No	Yes	Yes
Warranty	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime
CPU Rating	●●●	●●●◖	●●●●	●●●	●●●●	●●●◖

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

memory kit. As its name implies, this dual-channel kit sports a 4GB capacity with an impressive rated frequency of 2,133MHz. Other specifications include a CAS latency of 9 and a 1.65V voltage requirement.

Aside from the impressive specifications, the HyperX KHX2133C9D 3T1K2/4GX kit is also outfitted with enormous heatsinks that extend about an inch beyond the tops of the modules. Despite the relatively high clock speed of this Kingston kit, the heatsinks keep the memory running cool. Of course, the performance of this kit is top-notch, as is evidenced by its sweep of the benchmarks.

This kit really has it all, but Kingston knows that and charges one heck of a premium. If money is no object, you can't do much better than the KHX2133C9D3T1K2/4GX kit. If money is tight and you're willing to make a slight compromise, there are plenty of cheaper DDR3 kits that are capable of producing similar, albeit lower, performance. ▲

by Marco Chiappetta

Dual-Channel Memory Is Back, Baby

The results show some interesting trends. As expected, overall, the highest-clocked memory kits offered the best performance, despite them having relatively high CAS latencies of 9. The lower-latency DDR3-1600 Kingston HyperX KHX1600C8D3K2/4GX kit, which has a CAS latency of 8, however, edged past the OCZ kit in Everest's Read test. The total bandwidth offered by each memory kit increased significantly as clock speeds went up, and the delta separating the DDR-1333 (A-Data) and DDR3-2133 (Kingston) kits was over 18.3% in the Crysis benchmark.

Unlike the triple-channel memory configurations required to wring the most performance from Core i7 900 series/X58 Express-based systems, which hit a sweet spot at around the 1,600MHz to 1,866MHz marks before diminishing returns kick in, the dual-channel setup in Lynnfield-based Core i5 and Core i7 i7-800 series systems offered significantly increased performance all the way up to 2,130MHz. If you're thinking of building a Lynnfield-based system and want the best performance possible, we'd recommend going with the highest-clocked, fastest memory kit you can afford. Taking value into consideration, the DDR3-1,600MHz kits offer good bang for the buck and are absolutely worth the extra investment. It would be much tougher to justify the huge price premiums commanded by the 2,000MHz and faster kits.

Test System: 2.93GHz Intel Core i7 i7-860 (2.93GHz, Turbo mode Mode enabled), Asus P7P55D-E Premium (P55 Express chipset), Nvidia GeForce GTX 280 GPU, Western Digital Raptor 150GB hard drive, PC Power & Cooling Turbo-Cool 1,200W PSU, Windows 7 Ultimate 64-bit edition.

by Marco Chiappetta

					Lavalys Everest Cache & Memory Benchmark				SiSoft SANDRA Memory Bandwidth & Latency				Crysis CPU Benchmark
	CPU Frequency (w/ Turbo)	Base Clock (BCLK)	Memory Frequency	CAS Latency	Read (GBps)	Write (GBps)	Copy (GBps)	Latency (ns)	Aggregate (GBps)	Integer (GBps)	Floating Point (GBps)	Latency (ns)	(800 x 600, low quality)
A-Data HY63I1B16K	**2,933MHz**	**133**	1,333MHz	9	13.19	10.89	14.45	51.9	17	17	17	75	152.34
Corsair Dominator CMD4GX3 M2A1600C8	**2,933MHz**	**133**	1,600MHz	8	14.19	10.91	15.99	47.5	19.52	19.52	19.52	68	155.06
Kingston HyperX KHX1600C8 D3K2/4GX	**2,933MHz**	**133**	1,600MHz	8	15.91	11.71	15.16	46.2	19.74	19.73	19.74	68	157.4
OCZ Platinum OCZ3P 1866LV4GK	**3,111MHz**	**155**	1,866MHz	9	15.81	12.28	17.41	43.7	22.69	22.65	22.72	60	161.23
G.Skill Trident F3-16000 CL9D-4GBTD	**3,014MHz**	**167**	2,001MHz	9	17.36	13.02	17.95	43.3	23.33	23.31	23.34	59	174.25
Kingston HyperX KHX2133 C9D3T 1K2/4GX	**3,017MHz**	**178**	2,130MHz	9	17.76	13.31	18.72	40	25.44	25.46	25.43	55	180.32

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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ICANN Fee	Included	Included	$0.18
E-mail Account	FREE 2 GB Mailbox	NO Mailbox Included	FREE 1 GB Mailbox
Total Annual Cost	~~$8.99~~ $6.99 first year*	$18.95	$19.86

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Printers That Do Everything But Make Toast

For many of us, it makes sense to spend slightly more for an all-in-one printer than it does to purchase a standard inkjet or laser printer. You have the convenience of a copier, scanner, and, depending on the unit, fax machine in a single unit similar in size to a standard printer. Many new AIO printers include features, such as photo-quality prints, a built-in duplexer for two-sided printing, and Wi-Fi connectivity, that were once limited to high-end models. Some AIOs can even connect with an iPhone or iPod touch to let you print photos, calendars, documents, and contacts via the Wi-Fi or USB connection. Here, we'll take a look at some of the newest AIO printers from Brother, Canon, Epson, and HP.

How We Test

To check the printer's rated speed, we time our 10-page test document from the moment the document is sent to the printer, which is connected to our PC via USB. To factor in all possible variables, we send the 10-page document while the printer is in sleep mode, so the PPM (pages per minute) rating includes the time it takes for the printer to wake up, process the print job, and produce all 10 pages. We also check to ensure that the printer is delivering the pages at its highest quality.

In terms of print quality for text, each page of the test document features 7-, 9-, 10-, 12-, and 14-point fonts. Some of the lines in each font size are italicized and bolded, and a different font style is used on each page. We examine the text for clarity and consistency. For color quality, we insert photo paper and print some colorful images, a few photos with lots of close-up detail, and a black-and-white print with bright whites and dark blacks. Again, we run the photo tests at the printer's highest quality. The speed, print quality, and features are weighed equally, in comparison to the printer's price to rate the printer.

Brother MFC-9320CW

The MFC-9320CW is a color laser AIO that supports pretty much all types of connectivity. Its built-in 802.11b/g connection can function in ad-hoc mode to let any wireless device connect to the printer, or it can work in infrastructure mode for those looking to secure access to the printer through a wireless access point. If you'd prefer the stability of a wired connection, there's an Ethernet port, traditional USB printer port, and a USB Direct Interface on the front of the printer. The USB Direct Interface is PictBridge-compatible, and you can scan images to or print content directly from a flash drive. Supported file types for the USB Direct Interface include PDF, JPEG, TIFF, PostScript 3, and XPS 1.0.

MFC-9320CW
$499.99 | Brother
www.brother-usa.com
●●●◖

Setup of the printer is fairly straightforward. The MFC-9320CW's Quick Startup Guide offers detailed instructions for setting up the printer through the USB, wired network, and wireless connections—for both Windows and Mac users. Wi-Fi setup was particularly easy with routers that support SecureEasySetup, Wi-Fi Protected Setup, or AOSS (AirStation One-Touch Secure System). Brother boasts that the MFC-9320CW produces both color and black-and-white pages at 17ppm, and, excluding startup time, those numbers were accurate. The laser printer took 13 seconds to start up, knocking it down to 12ppm. Those who work with specialty papers, such as envelopes, labels, or thick card stock, will appreciate the manual feed slot at the front. One unique feature is the Secure Function Lock, which lets you block the use of the printer—great for stopping kids or intrusive roommates from copying, scanning, or faxing.

Not surprisingly, text from the laser printer was the most crisp of any of the models—the others being inkjets—in the roundup. In particular, bolded text appeared to jump off the page, while italicized text was clearly readable at all font sizes. The inkjets struggled with the small, thin lines of the 7-point italicized font. The MFC-9320CW also produced some of the highest scan and copy quality in the roundup. Lasers can't really compete with inkjets when printing photos, but the MFC-9320CW did a great job with charts and other graphics.

Pixma MP560
$149.99 | Canon
www.usa.canon.com
●●●◖

Canon Pixma MP560

This Wi-Fi-enabled AIO is easily the smallest printer in our roundup, standing at only 6.3 inches tall. In fact, when the printer is closed up, it's tough to tell that the MP560 is a printer.

The photo-centric Pixma MP560 features five ink cartridges: a pigment black (used when printing text) and dye-based cyan, magenta, yellow, and black. You can connect it via USB or 802.11b/g—no Ethernet port—or directly print content from memory cards (the MP560 supports CF, SD, SDHC, and MS [Memory Stick] formats), your digital camera, or a flash drive. Accessing content without a PC was easy, because Canon includes a scroll wheel (like an iPod) and a circular menu interface that rotates with the scroll wheel. The 2-inch color LCD sits in a pop-up panel that covers the scroll wheel and other controls.

Canon includes all the ink cartridges (full-sized), software CD, and a Getting Started guide. Installing the Canon software took around 10 minutes. We liked that Canon doesn't integrate the print head, so you can replace it without having to send back the entire printer. To set up the wireless connection, we used the WPS' push-button method, but the Pixma MP560 can also detect your wireless network and let you enter your authentication information from the printer. Either way, we prefer this to hardwiring the printer to our PC and going through a setup wizard.

The Pixma MP560 was the fastest of the inkjet printers in our 10-page test document, at 10ppm. We particularly liked that it awoke from sleep mode in less than five seconds.

It was also great with photos. For example, in our Golden Gate Bridge test photo, the cable suspensions appear distinctive and crisp; other printers had trouble with this detail. Color was vibrant and true, and in our black-and-white photo, the MP560 displayed the greatest contrast between brights and darks. Text was less impressive, often leaving specks of color around even large fonts. Still, if you're not using the printer for business purposes, the quality should be fine.

Epson Artisan 810

An AIO with a 7.8-inch touch panel and a 3.5-inch LCD? You better believe it. The Artisan 810's touch interface made it easy to utilize the built-in editing features, from basic changes—such as crop and rotate—to the Artisan's coloring book and personalized notepaper edits.

Epson also includes a number of uncommon features in the Artisan 810. Topping the rare features list is the printer's powered USB port, so you can charge your portable USB devices while sitting at your desk. If you have an iPhone or iPod touch with an e-Printing application, you can print to the Artisan 810 when connected via the powered USB port or Wi-Fi. To print from other mobile devices, you can purchase an optional Bluetooth adapter ($39). For printing to CD or DVDs, you'll no longer need to deal with a cumbersome disc holder because Epson has integrated a disc loading tray into the printer. We simply had to click the CD tray button, and the Artisan 810 ejects the tray. There's also a dedicated photo tray that can hold 4x6 or 5x7 prints. Epson smartly designed the printer so that all of these features are easily accessible from the front panel. In terms of AIO features, it offers a built-in duplexer, a 30-page automatic document feeder, and a fax machine that can receive color and black-and-white faxes. For network connectivity, you can connect via the USB port, Ethernet port, or 802.11b/g.

The Artisan's scan quality rivaled Brother's MFC-9320CW as tops in our roundup. In the 10-page document test, we were impressed by the Artisan 810's quality down to 9-point fonts. However, its 22-second wake-up time from sleep mode seriously slowed its speed; it registered 9ppm. At first, we were slightly disappointed by the Epson's photo quality, because shadows and other dark highlights appeared much darker than our on-screen image. By default, Epson turns on its photo correction, and when we turned it off, the Artisan 810 produced accurate, vivid color. The Artisan 810 also showed good detail and color degradation. And when combined with its high-quality text, it delivered the most well-rounded performance of the AIOs.

Artisan 810
$299.99 | Epson
www.epson.com
●●●●

HP Officejet 6500 Wireless All-In-One Printer

The Officejet 6500 Wireless All-In-One offers 802.11b/g network connectivity, a

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

built-in duplexer, and flash memory for retaining faxes, even if there's a power outage. It features a scanner with an optical resolution of 2,400dpi (dots per inch) and can copy material (at the lowest quality setting) in color at up to 31ppm. The scanner flatbed supports up to 8.5 x 11 paper, but you can also feed content to the scanner through the automatic document feeder, which supports up to 35 sheets of legal paper. We like that the duplexer can handle envelopes, great for if you want to add your business logo or event information to mail.

There are built-in memory card slots for SD (supports SDHC), MMC, xD-Picture Card, and the various MS formats. The four ink cartridges (full-sized), USB cable, and telephone cord are all included. HP's setup software took us step-by-step through the setup process. The software took around 10 minutes to install, but once we got started, we were happy with how thorough and intuitive the wizard program was. Make sure you check the printouts from the alignment process. We had to clean the print heads so colors and black levels would appear correctly.

HP also boasts that the printer can output 32ppm in black-and-white or 31ppm in color after the first page is sent and on the lowest quality settings. Of course, we tested the Officejet 6500 Wireless at its high-quality settings, and it produced around 8ppm, partially because it was hindered by a 35-second wake time from sleep mode. Text in our 10-page test document was darker than the other printers in our roundup, so much so that it was difficult to tell the difference between bolded and nonbolded text. Still, the Officejet 6500 produced the most speckle-free text quality of the inkjets tested, and the dark text may come in handy with office work. The color quality of photos, which we printed at the Maximum DPI setting, showed exceptional gradation, but the AIO suffered from muddled details, such as the peaks of ocean waves and grass.

Final Thoughts

If you're looking for a printer that can handle everything you throw at it, you can't go wrong with Epson's Artisan 810, which offers a blend of high-quality performance and design ingenuity. That being said, business workers may prefer the snappy Brother MFC-9320CW or the value of HP's feature-filled Officejet 6500 Wireless All-in-One Printer. And with great photo quality and an affordable price, photo enthusiasts looking for a quality AIO should check out Canon's Pixma MP560. ▲

by Nathan Lake

Officejet 6500
Wireless All-in-One Printer
$199.99
HP
www.hp.com
●●●

All-In-One Specs, All In One Chart

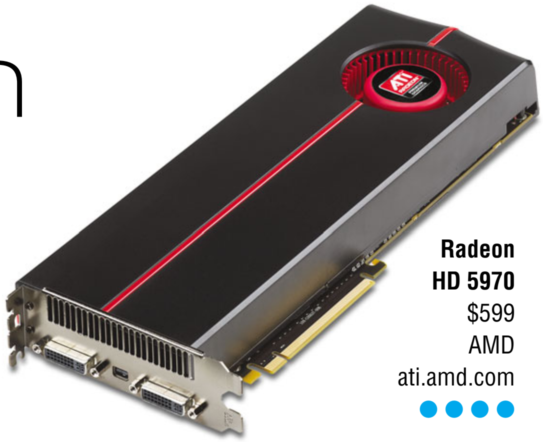
	Brother MFC-9320CW	Canon Pixma MP560	Epson Artisan 810	HP Officejet 6500 Wireless All-in-One Printer
Tested Print Speed (color; 10 page document test	12ppm	10ppm	9ppm	8ppm
4x6 Photo Speed (Highest Quality)*	n/a	1:30	1:20	1:15
8.5x11 Photo Speed (Highest Quality)*	n/a	3:44	3:20	3:10
Auto duplexer	Yes	No	Yes	Yes
Ethernet port	Yes	No	Yes	Yes
Wi-Fi connectivity	Yes	Yes	Yes	Yes
Built-in memory card slots	No	SD, SDHC, MMC, CF, and MS formats	SD, SDHC, xD-Picture Card, MS formats	SD, SDHC, MMC, xD Picture Card, and MS formats
USB Direct Interface	Yes	Yes	Yes	Yes
Automatic Document Feeder	Yes (up to 35 pages)	No	Yes (up to 30 pages)	Yes (up to 35 pages)
Scanner bit depth	48-bit	48-bit	48-bit	48-bit
Estimated Yield For Standard Cartridge (ISO/IEC 24711); price	Varies	342 pages; $12.99 per cartidge	450 pages; $10.44 per cartridge	300 pages $9.99 per cartridge
Price	$499.99	$149.99	$299.99	$199.99
CPUs	●●●◖	●●●◖	●●●●	●●●

*minutes:seconds

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

AMD ATI Radeon HD 5970

It Takes Two, Baby



Radeon HD 5970
$599
AMD
ati.amd.com
●●●●

Specs: GPU: Dual Cypress R870s; Core clock: 725MHz; Memory: 256-bit bus, 2GB GDDR5 (1,000MHz); 3,200 shaders processors; 160 texture units; 64 ROPs

Until now, AMD's graphics performance crown came with an asterisk. Although the Radeon HD 5870 was hands down the fastest GPU on the market, AMD couldn't claim to have the fastest graphics card—Nvidia's dual-GPU GeForce GTX 295 still firmly held that title. But all that changes with the launch of the Radeon HD 5970.

R870 Times Two

Shedding the X2 suffix used to describe the dual-GPU cards from AMD's 3000 and 4000 series, the latest dual-GPU beast gets the new 5970 surname instead. This card is structurally identical to the previous-generation X2s, consisting of a single PCB with two R870 GPUs and a PLX PCI Express 2.1 Gen 2 bridge chip in between to handle the CrossFire communications. Unlike previous-generation X2s, however, the 5970 comes strapped to a much more advanced cooler, which uses vapor chamber technology to more aggressively expel heat. The card is also a record-breaking 12 inches long; we actually had to rebuild our test machine in a larger case to accommodate it. Two R870 GPUs and the memory in the 5970 are clocked at Radeon HD 5850 levels—725MHz and 1,000MHz, respectively. But unlike the 5850, these GPUs have the full complement of SIMD engines, so stream processors, texture units, and ROPs number 3,200, 160, and 64, respectively. The reason for the modest clocks became evident when we noticed the card's 294-watt max board power. Higher clocks would surely have pushed PSUs built to spec to the brink. The 5970 also features an impressive 43-watt idle power draw.

Benchmark Numbers	Windows 7	
Specs & Scores	Radeon HD 5970	BFG GeForce GTX 295
Price	$599	$499
Core clock	725MHz	576MHz
Memory clock	1,000MHz	999MHz
Memory	2GB GDDR5	1,792MB GDDR3
3DMark Vantage Performance		
Overall	P15149	P14367
GPU Score	18010	16563
GPU1 (fps)	50.66	48.53
GPU2 (fps)	54.92	48.5
CPU Score	10260	10279
CPU1 (Plans/s)	1327.39	1312.65
CPU2 (Steps/s)	15.92	16.38
3DMark Vantage Extreme		
Overall	X11206	X8887
GPU Score	11266	8829
GPU1 (fps)	34.7	29.31
GPU2 (fps)	31.24	22.3
CPU Score	10180	10150
CPU1 (Plans/s)	1313.93	1315.55
CPU2 (Steps/s)	15.87	15.69
Games	1,920 x 1,200	
Far Cry 2 (4XAA)	74.52	62.13
Left 4 Dead (8XAA, 16XAF)	129.7	115.07
Crysis (4XAA)	34.17	27.55
	2,560 x 1,600	
Far Cry 2 (4XAA)	67.66	55.56
Left 4 Dead (8XAA, 16XAF)	113.68	82
Crysis (4XAA)	7.67	8.92

Test system specs: 3GHz Phenom II X4 940, Biostar TA790GX 128M (AMD 790GX + SB750), Crucial 4GB DDR2-800, Corsair HX1000W PSU, 1TB Western Digital Caviar Black HDD

Driver: ATI Catalyst 9.10 Beta (8.663.1); ForceWare 191.07

The Enthusiast's Edge

If you think the 12-inch PCB and vapor chamber cooler seem excessive, you're partly right. The 5970's cooler is designed to dissipate 400 watts. Why so much? Because AMD has unlocked the 5970 so you can overclock it like never before. Call it the Black Edition of graphics cards (according to our conversation with AMD, that almost happened officially). In our tests, with the help of an AMD-supplied voltage tweaking utility that bumped the core and memory voltage to 1.1625V and 1.15V, respectively, we achieved core and memory clocks of 775MHz and 1,050MHz. AMD tells us that 5970 owners will have access to the voltage tweaking utility, as well, but your results will vary. We used the Catalyst Control Center's built-in ATI Overdrive Auto-Tune function to set our overclock.

Although our overclock was rather modest, the first GPU climbed to a stunning 940MHz while the second GPU topped out at 775MHz. If the second GPU had similar clock thresholds to the first, we might have seen nearly a 20% performance boost. We don't recommend you buy the 5970 in the hopes of getting a high overclock, but the possibility is there. The overclock did earn the 5970 a few fps in 3DMark Vantage's game tests and less than a frame better in Far Cry 2.

Shift Of Power

With a budget-busting $599 price tag, the Radeon HD 5970 is an impressive offering that's not for everybody. But if you want the best of the best available, then there's really no other choice. ▲

by Andrew Leibman

For bonus performance data, subscribers can go to www.cpumag.com/cpujan10/radeon5970.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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Regular Price: $1,794	Regular Price: $1,991	Regular Price $2,766	Regular Price $3,853
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Base Specifications: Intel Core i7 860 Processor 4GB DDR3 1600MHz Memory EVGA P55 SLI Motherboard NVIDIA GTX 275 896MB 500W Silent Power Supply	**Base Specifications:** Intel Core i7 920 Processor 3GB DDR3 1600MHz Memory EVGA X58M Motherboard NVIDIA GTX 275 896MB 750W Silent Power Supply	**Base Specifications:** Intel Core i7 920 Processor 6GB DDR3 1600MHz Memory EVGA X58 LE Motherboard 2x SLI NVIDIA GTX 275 896MB 1000W Silent Power Supply	**Base Specifications:** Intel Core i7 960 Processor 6GB DDR3 1600MHz Memory EVGA X58 LE Motherboard 2x SLI NVIDIA GTX 295 1GB 1200W Silent Power Supply

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Ultrasone Zino

I'll put all my cards on the table up front: I couldn't be more enthusiastic about German manufacturer Ultrasone's Zino headphones. In nearly all respects—including comfort, sound quality, and affordability—the Zino delivers the goods. Although it pains me to go the "best ever" route, where headphones specifically designed for mobile devices are concerned, the Zino probably ranks the best among the dozens of headphones I've slipped on my dome.

Zino
$99
Ultrasone
zino.ultrasone.com
●●●●

Several traits about the Zino stand out, including its eye-popping, mirrored earpieces. Beyond sporting a square-like headband that's surprisingly comfortable, the Zino's expandable arms are foldable, and its mesh-covered ear cushions are remarkably soft. At roughly just 3 ounces, the Zino is barely noticeable even during long stretches. The only catch is it's not especially conducive for active wear.

The design segues nicely to the Zino's semi-open ear cushion approach, which deviates from the noise- and sound-isolating headphones flooding the market, and the Zino's use of Ultrasone's patented S-Logic technology. S-Logic aims to cover the entire outer ear in audio, not just tunnel it to the inner ear. Ultrasone says the Zino stands alone in using "all of your sense of hearing" in this way, with the result being "broad and detached" sound that "does not change your personal hearing" but "intensifies it."

What's really important is the Zino's flat-out magnificent audio quality, which has an addicting aural, spacious vibe that my other mobile headphones don't. Nuances in everything from Jack White's funky cymbal work on The Dead Weather's "I Cut Like A Buffalo" to Little Walter's huffing and puffing harmonica on Muddy Waters' "Louisiana Blues" are abundantly noticeable. On M. Ward's low-fi-flavored "Rave On," meanwhile, the Zino gives purpose and depth to Zooey Deschanel's backing guest vocals. The bass lines in the Wu Tang Clan's "Method Man," meanwhile, pulsed with mad intentions without ever overwhelming the track.

Great-looking and more than up to snuff audio-wise, the Zino is the rare product that equally delivers superior design and performance. It's hard to imagine your iPod touch or Zune HD won't thank you for the effort. ▲

Specs: Frequency rate: 15 to 25kHz; Sound pressure level: 101dB; Impedance: 35Ohm; gold-plated 3.5mm connector; 40mm gold-plated driver; carrying case included

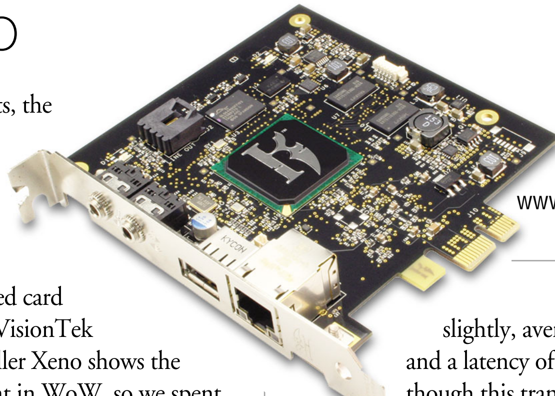
by Blaine Flamig

VisionTek Killer Xeno Pro

With the help of Bigfoot Networks' technology, VisionTek is tackling gaming network performance with the Killer Xeno Pro network card. The Killer Xeno works by routing all game traffic through the card, rather than the Windows network stack on the CPU, theoretically speeding up performance by 40% and increasing the frame rate by 27%, according to VisionTek.

We tested the Killer Xeno by monitoring the frame rate and latency in Team Fortress 2 and World of Warcraft. We compared averages between our system's onboard Realtek 8111C PCI-E Gigabit Ethernet Adapter and the Killer Xeno using Fraps and also the PerfMon add-on for WoW.

In our TF2 tests, the Killer Xeno came out ahead in terms of frames per second, averaging 202fps, while the integrated card averaged 135fps. VisionTek asserts that the Killer Xeno shows the most improvement in WoW, so we spent some time comparing scores while competing in Alterac Valley, a 40v40 battleground. We attempted to create as similar a test experience as possible for each network card by running the same battleground back-to-back. Our integrated card averaged 144fps and held a steady latency of 235ms. With the Killer Xeno, our scores improved slightly, averaging 164fps and a latency of 215ms. Even though this translates to a nearly 10% improvement in latency, there wasn't a significant difference to the feel of actual gameplay.



Killer Xeno Pro
$104.99
VisionTek
www.visiontek.com
●●●

VisionTek's Killer Xeno is available on Newegg.com for roughly $100. Although it functioned as promised, the price tag seems a little hefty for the small performance boost. However, if you still have a little Christmas cash lying around and are vying for the ultimate gaming experience, the Killer Xeno Pro can get you a little closer. ▲

Specs: Speeds: 10/100/1000Mbps; Network Processing Unit clock speed: 400MHz; Memory: 128MB DDR-266; Interface: PCI-E x1; Ports: RJ-45, USB 2.0, 3.5mm audio

Test System Specs: Processor: 2.66GHz Intel Core i7-920; Motherboard: MSI X58M MS-7593 v1.1; GPU: Evga GeForce GTX 295; Memory: 6GB OCZ DDR3-1600; Hard drive: 300GB WDC; 30GB OCZ Vertex SSD; Operating System: Windows Vista 64-bit

by Kris Glaser Brambila

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Asus P7P55D-E Premium

P7P55D-E Premium
$279
Asus
www.asus.com
●●●●

Intel's P55 Express chipset is billed as a mainstream alternative to the high-end X58 Express. Motherboard manufacturers, however, have used the P55 Express for some decidedly high-end products. Take the Asus P7P55D-E Premium, for example. In addition to exploiting all of the features of the P55, Asus has upped the ante on this $279 motherboard with the inclusion of SATA 6G and USB 3.0 support as well as a couple of interesting value adds.

As its name suggests, the P7P55D-E Premium is built around Intel's P55 Express chipset and sports an LGA-1156 socket for Core i5 and Core i7 800 series processors. As you'd expect from Asus, the P7P55D-E Premium is loaded with features, has a clean layout, and has an enthusiast-friendly BIOS geared toward overclockers. But Asus' implementation of SATA 6Gbps and USB 3.0 support is what sets this board apart.

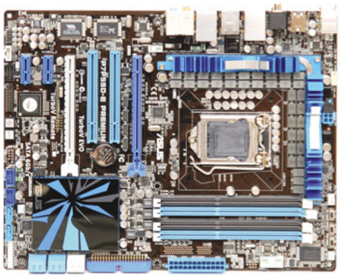
The P7P55D-E Premium features a Marvell 9123 6G SATA controller, which powers a pair of white SATA ports. And instead of connecting the controller directly to the P55's Gen 1 PCI-E lanes, the Marvell 6Gbps SATA controller and NEC USB 3.0 controller are linked to the chipset via a PLX8613 Gen 2 PCI-E bridge. This minimizes a potential performance bottleneck that could've occurred by connecting the controllers to the chipset via a single PCI-E x1 lane.

If you're itching to build a high-end LGA-1156 system, be sure to put the P7P55D-E Premium on your short list of motherboard considerations. ▲

by Marco Chiappetta

Specs: Chipset: P55 Express; Form factor: ATX; Ports: 2 Gigabit Ethernet, 2 SATA 6Gbps, 6 SATA 3Gbps, 2 USB 3.0, 10 USB 2.0; Slots: 2 PCI-E x16 (SLI/CrossFire), 2 PCI-E x1, 2 PCI

Test system specs: 2.93GHz Core i7-870; Asus P7P55D-E Premium; 4GB Corsair DDR3; Nvidia GeForce GTX 280; Western Digital Raptor 150GB; Windows 7 Ultimate 64-Bit Edition



Benchmark Numbers	Asus P7 P55D-E Premium
PCMark Vantage	9216
Memories	7192
TV And Movies	5739
Gaming	10411
Music	8317
Communications	8207
Productivity	7719
Cinebench R10	
Multithreaded	19016
LAME MT*	
Multithreaded	0:25
x264 HD Encoding**	
First pass	81.91
Second pass	30.71
Crysis v1.21	
800 x 600, low quality	164.57

*minutes:seconds **fps

Seagate Barracuda XT 2TB

Solid-state drives may be all the rage lately, but that hasn't stopped traditional spinning-platter hard drive manufacturers from innovating. Seagate, for example, recently released its first 2TB desktop hard drive with a SATA 6Gbps interface, the Barracuda XT.

Seagate has segmented its desktop hard drive offerings into the following three distinct groups as of late: the Barracuda LP for low-power applications, the Barracuda 7200 series for mainstream consumers, and the new XT series for power users and gamers. The current top-of-the-line Barracuda XT is the ST32000641AS. In addition to the new interface and 2TB capacity, the drive sports a 7,200rpm spindle speed and 64MB of cache. The drive uses four 500GB platters, with an areal density of 347Gbpsi.

Although the Seagate Barracuda XT is undeniably a fast hard drive—in fact, it's one of the fastest we've tested—we can't help but feel the inclusion of the SATA 6Gbps interface was more for marketing purposes than performance. In testing on a Marvel 9132 SATA 6G controller, the Barracuda XT proved to be a strong performer, with ATTO transfer rates in the 140MBps range with transfer sizes above 64K and average read speeds above 116MBps in HD Tach. But connecting the drive to a SATA 3Gbps interface had virtually no impact on performance, save for a lower burst speed in HD Tach (which is inflated while using the SATA 6Gbps interface).

Users in the market for a fast, high-capacity storage drive should absolutely consider the Barracuda XT ST32000641AS; it's a killer drive. Just don't expect any miracles from the SATA 6Gbps interface. ▲

Barracuda XT 2TB
$299
Seagate
www.seagate.com
●●●◖

by Marco Chiappetta

Specs: Capacity: 2TB; Cache: 64MB; Interface: 6Gbps SATA; Spindle speed: 7,200rpm; Areal density: 347Gbpsi; Average latency: 4.160ms (nominal); Acoustics: 28dBA (idle), 32dBA (seek)

Test system specs: 2.93GHz Core i7-870; Asus P7P55D-E Premium; 4GB Corsair DDR3; Nvidia GeForce GTX 280; Western Digital Raptor 150GB; Windows 7 Ultimate 64-Bit Edition

Benchmark Numbers	Seagate Barracuda XT 2TB
HD Tach	
Average read/write (MBps)	116.4MB/95.4
Burst	1.93GBps
Random Access	17.3ms
CPU Utilization	3%
ATTO Disk Benchmark (read/write)	
4K transfers (MBps)	140/88
64K transfers	144/138
8MB transfers	148/138

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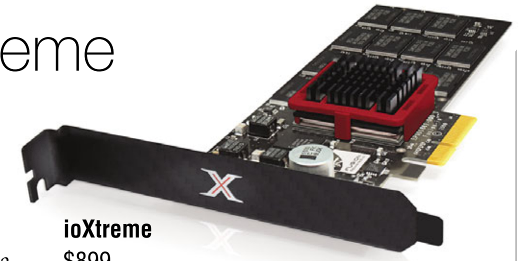
Fusion-io ioXtreme



ioXtreme
$899
Fusion-io
www.fusionio.com
●●●●

Fusion-io's PCI-E-based approach to the SSD hit the scene about a year ago. It delivered insanely good performance but had an insanely high price tag to match; it was really only feasible in enterprise storage environments.

Fusion-io recently announced a consumer-targeted version, built on less expensive MLC NAND flash, dubbed the ioXtreme. The ioXtreme looks similar to the original ioDrive, except its price is orders of magnitude less, so to speak. You'll still fork over $899 for an 80GB card, but that price is now within striking distance for extreme performance enthusiasts and workstation professionals.

Performance-wise, the ioXtreme ripped through our battery of standard disk benchmarks. It posted record-breaking numbers—sometimes by a wide margin—against an Intel SSD RAID 0. It trounced other SSD challengers, too. The ioXtreme really excelled with random access patterns, such as application loading. Also, with an ioXtreme Pro ($1,499 or $1,995 for a two-card Pro/Standard bundle) you can RAID a couple of these bad boys together (sacrificing an x8 or x16 slot if your motherboard doesn't have two x4 slots). The only drawback (beyond its price premium) is that Fusion-io hasn't made the product bootable yet, though we hear that's coming soon.

Still, if you want the fastest SSD performance on the market today, don't think it has to have a SATA interface stuck on the back of it. Fusion-io's ioXtreme rides a simple PCI-E slot to blistering bandwidth. ▲

by Dave Altavilla

Specs: Interface: PCI-E x4; Read/write bandwidth (64K packet size): 280MBps/700MBps

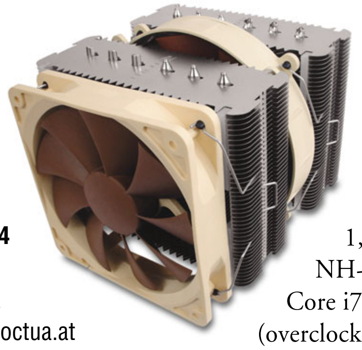
Test System Specs: 2.93GHz Intel Core i7-920, Gigabyte GA-EX58 Extreme (X58 chipset), 6GB DDR3-1333, Windows Vista Ultimate 64-bit, WD Raptor WD1500 OS drive

Benchmark Numbers

	Fusion-io ioXtreme
Sisoft Sandra Physical Disk Test*	
Read	813.8
Write	286.18
ATTO Disk Benchmark*	
32K Transfer Read	718.4
32K Transfer Write	307.8
HDTach*	
Avg. Read	580.2
Avg. Write	290.5
Burst	744.1
CPU Utilization	6%
Iometer	
Workstation Access Pattern (IOPS)	41,456
PCMark Vantage*	
Windows Photo Gallery	220.14
Windows Defender	412.19
Vista Startup	652.64
Gaming	328.33
Windows Media Center	278.39
Windows Movie Maker	194.6
Application Loading	429.49
Windows Media Player	233.96

*Results in MBps

Noctua NH-D14



NH-D14
$80
Noctua
www.noctua.at
●●●●

Is there such thing as overkill? Clearly, the folks at Noctua don't believe so. Its NH-D14 looks more like two radiators crammed together, separated by a pair of cooling fans. Of course, the array comes together at its base, connected by no fewer than six heatpipes per block of aluminum fins.

Perhaps the most immediate worry you might have about such a massive cooler would be how it'd fit on your motherboard. We were pleasantly surprised, though, that the NH-D14 had no trouble dropping into our Asus Rampage II Extreme. And judging by the compatibility list on Noctua's Web site, the company has done a lot of testing to validate the past few years' most popular enthusiast platforms.

Your next question might involve installation. How do you fit a screwdriver around such large fins, anyway? The NH-D14 ships with its fans installed, but there's a clear path to a pair of screws that secures the fans to a mounting bracket. As a result, the sink is actually easier to install than many other smaller coolers we've tested.

The fans—one 120mm and one 140mm—are more than just audible. But Noctua supplies a pair of adapters for each, which tempers cooling capacity in favor of less noise. Don't worry if you feel compelled to use one of the adapters, either. Spinning at 1,300rpm, the NH-D14 kept our Core i7-975 Extreme (overclocked to 4 GHz) running at 32 degrees Celsius when idle and 72 C under the load of eight threads of Prime95.

It's tempting to doubt the practicality of dual radiators and twin fans towering over a Core i7 or Phenom II processor, but the NH-D14 proves that lots of surface area and competent fans make a difference. But can you derive $80+ of value from this beast? Although it's the most effective cooler we've ever seen, you can also get great results from much cheaper alternatives. ▲

by Paul Cross

Specs: Socket compatibility: LGA-1366/1156/775, AM3/AM2+; Dimensions: 160mm x 140mm x 158mm (HxWxD); Weight 1.24kg (with fan); Materials: Copper base, aluminum fins; Fans: 1 120mm (1,300rpm), 1 140mm (1,300rpm)

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OCZ Colossus

Colossus
$1,130 (256GB), $1,779 (512GB)
OCZ
www.ocztechnology.com
●●●●

If two heads are better than one, it follows that two or four drives in one package should be better, as well. This is the premise of OCZ's Colossus, the first 3.5-inch SSD for consumers. Inside the drive, a pair of NAND-laden PCBs, each sporting Indilinx controllers, flows into a SATA backplane hosting three Silicon Image 5923 controllers. Each PCB is essentially two OCZ Vertex drives (sans shell), giving the potential for a 1TB maximum capacity.

On a cost-per-GB basis, the two Colossus models now shipping land at $4.41 (256GB unformatted) and $3.47 (512GB), which isn't far astray of current averages. In comparison, the higher-performance OCZ Agility EX 60GB (reviewed last month) hits $6.83/GB.

Where the Colossus blew us away was on write speeds, which were pretty much at parity with read speeds. Given that the Achilles heel of SSD has always been its write performance, this is a huge advance. At last, we have a single SSD able to trounce the sustained write throughput of a WD VelociRaptor by 2X.

The Colossus doesn't support TRIM, instead opting for OCZ's Garbage Collection method. The omission of NCQ is puzzling, and with test numbers that pretty much fill a SATA 3Gbps pipe, we hope a SATA 6Gbps update is in the works for 2010.

Nevertheless, the data tells it all. If you want insane write performance, Colossus towers over the field. ▲

by William Van Winkle

Benchmark Numbers

	OCZ Colossus
Sisoft Sandra Physical Disk	
Read Performance (MBps)	247.88
Write Performance (MBps)	245.64
HDTach Full Bench	
Average Read (MBps)	232.9
Average Write (MBps)	235.5
CrystalDiskMark 2.2	
File Size	100MB
Seq. Read (MBps)	256
Seq. Write (MBps)	255.1
512K Read (MBps)	198.1
512K Write (MBps)	252.9
4K Read (MBps)	25.15
4K Write (MBps)	50.83
IOMeter Default (IOps)	6964.98
IOMeter Workstation (IOps)	4680.38

Specs: Formatted capacity: 250GB; Read/write/sustained write (advertised): 260/260/220MBps; Cache: 128MB; Seek time (advertised): <0.1 ms; Shock: 1,500G; MTBF: 1.5 million hours

Thermaltake BlacX Duet

BlacX Duet
$69.99
Thermaltake
www.thermaltakeusa.com
●●●◖

Dead gigs. That's what you get when you replace old HDDs with SSDs or swap out last year's 500GB bargains for some fresh 2TB action. Either way, you have SATA drives in a drawer doing nothing. If you missed the original Thermaltake BlacX, take heart, because the Duet now gives you two docking bays instead of one. Each bay fits either 3.5-inch or, thanks to a spring-loaded inset frame, 2.5-inch drives.

In testing our drive on an Intel DX58SO platform, we soon discovered the fact that Intel southbridges aren't fond of supporting eSATA port multipliers. (AMD southbridges have a similar affliction.) As a result, we could see two installed drives when connected via USB, but only one drive would register under eSATA. With a decent add-in eSATA controller from the likes of JMicron or Silicon Image, meaning one that supports port multipliers, you can see both drives over eSATA and USB 2.0.

To test the effectiveness of the Duet's eSATA connection, we grabbed an OCZ Agility and an OCZ Vertex SSD and ran them on internal SATA connections as well as through the Duet's USB 2.0 and eSATA ports.

We expected SATA and eSATA to yield similar numbers, but this wasn't the case. For a rough sense of relative read speeds, we pushed both drives on HD Tune Pro 3.5. Two things were immediately obvious: 1) The 33.3MBps ceiling of USB 2.0 will slow down practically any drive; and 2) Although eSATA dramatically outperforms USB, there is a significant penalty compared to internal SATA.

When you need top speed, go internal. When you want very good performance and convenience, put those old drives back in action with the BlacX Duet. ▲

by William Van Winkle

Benchmark Numbers

	OCZ Vertex			OCZ Agility		
	Avg. Read*	Max. Read*	Access	Avg. Read*	Max. Read*	Access
HD Tune Pro 3.5						
USB	32.3	33.3	0.4 ms	33.3	33.3	0.4ms
eSATA	141.2	145.8	0.2 ms	142.4	145.8	0.2ms
SATA	194	211.3	0.1 ms	218.4	219.6	0.1ms

*MBps

Specs: Interfaces: USB 2.0 and eSATA; HDD capacity: up to 2TB/slot; Dimensions: 2.74 x 5.51 x 4.76 inches (HxWxD); Weight: 3lbs.; USB and eSATA cables included

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Anand's Corner

by Anand Lal Shimpi

AMD's Savior: Bulldozer & A Whole Lot Of Cash

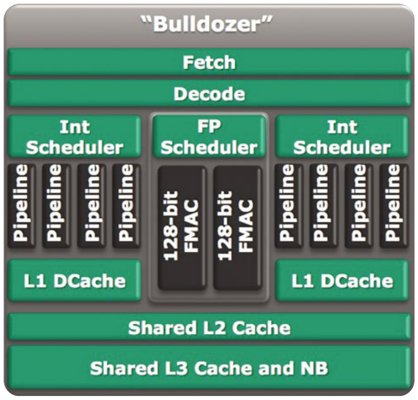
Two years ago, I didn't see a future for AMD. The company was in debt and appeared largely unprofitable, and there was no indication that it would be able to execute on its roadmap. It couldn't, as it turns out; AMD's next-generation microarchitecture, code-named "Bulldozer," was delayed until 2011.

What a difference a couple years can make. AMD has since spun off its manufacturing arm, and with the aid of significant investment from its partner ATIC, GlobalFoundries looks to be a strong contender in the foundry business. More recently, AMD has announced that its entire 2010 to 2011 roadmap is on track, and in some cases ahead of schedule. And to address one final worry, AMD reached a $1.25 billion settlement with Intel—the money should be in AMD hands by now.

No longer needing to worry about producing its CPUs at fabs (another side effect of the Intel settlement, AMD can officially go fabless with no threat of legal repercussions from Intel) and with a huge infusion of money (also from the settlement), AMD is saved. Now it's just up to the engineers to deliver something good.

We'll get a taste of that in 2010, but the real treat comes in 2011 with Bulldozer.

AMD has been relatively quiet on the threading front. Sure we got dual-, quad-, and hexa-core AMD CPUs, but those were all made by duplicating a core multiple times and lowering the clock speeds. With Phenom and Phenom II, we at least got a shared L3 cache.



Intel resorted to Hyper-Threading. In order to take advantage of its wide execution cores, Intel would throw twice the threads at each core with hopes of improving efficiency. The result was anywhere up to a 30% increase in performance, depending on the application. Given the minimal impact on die area, it's worth it.

Bulldozer is AMD's answer to Hyper-Threading. The smallest Bulldozer unit isn't a single core, it's a single module. The module is made up of two integer cores and a single floating-point core. The impact to die area is minimal (more than Hyper-Threading but still under 5% on a four-module chip), but the potential performance gains are huge: AMD puts it at up to 80% on integer code.

Each one of these integer cores has more performance than a single Phenom II integer core, so cram two of them on a single module and a one-module Bulldozer would be faster than a dual-core Phenom II (in integer code at least). Two Bulldozer modules would be faster than a quad-core Phenom II by the same logic.

AMD prevents things from getting out of hand by not scaling floating-point resources at the same rate as integer resources. AMD believes the future of FP work is on the GPU and, starting in 2011, will begin shipping its first monolithic APUs (Accelerated Processing Units: CPU + GPU on one die). Eventually, Bulldozer will be made available in APU form, and all FP-heavy work will get scheduled over on a many-core GPU while all branchy integer work happens on the Bulldozer modules. Anything in between could be handled by Bulldozer's FP core.

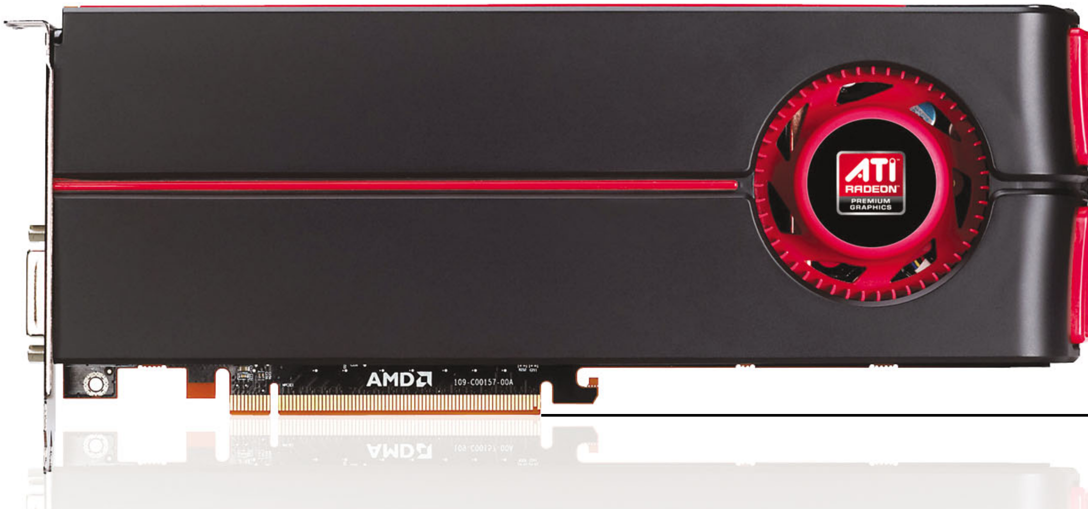
It really makes a whole lot of sense from a very high level. There's a lot more to answer about AMD's processors in 2011, but what we know about Bulldozer is a start. I'm excited. ▲

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' "48 Hours," and* Fortune. *AnandTech (www.anandtech.com) receives more than 55 million page views and is read by more than 2 million readers per month.*

Talk back to Anand at anand@cpumag.com

Cypress Unleashed

Radeon 5870 BIOS & Volt Mods For Hardcore Overclocking



AMD's ATI Radeon HD 5870 is powered by a DirectX 11-class GPU manufactured at 40nm that's comprised of approximately 2.15B transistors. Contributing to that massive transistor count are 1,600 stream processors, 80 texture units, and 32 ROPs—exactly double that of a Radeon HD 4890.

AMD's ATI Radeon HD 5870 is one beast of a graphics card. When it first hit the scene back in late September 2009, the Radeon HD 5870 smashed performance records and unquestionably claimed the single-GPU performance crown for AMD. There's simply no other GPU on the market currently that can touch it.

Although the ATI Radeon HD 5870 is an undeniably powerful graphics card in its stock form, additional performance is there for the taking with a bit of tweaking. When AMD and Nvidia are first to market with next-gen products, they tend to be conservative with the GPU and memory frequencies. Unless they have to max a card's capabilities to be competitive, these rivals typically make just-released flagship boards only fast enough to be exciting to enthusiasts. It's also common for the GPU manufacturers to keep voltages on the low side in order to keep power consumption down.

After experimenting with the ATI Radeon HD 5870 for a few weeks after launch, it was obvious that AMD was quite conservative with its first wave of reference cards. With some basic modifications and the right utilities, we found it possible to push the performance of the Radeon HD 5870 well above stock. The mods include a BIOS flash to unlock higher frequency options, basic cooling mods to keep temperatures in check, and overvolting and overclocking via a free utility from MSI.

Physical Modifications

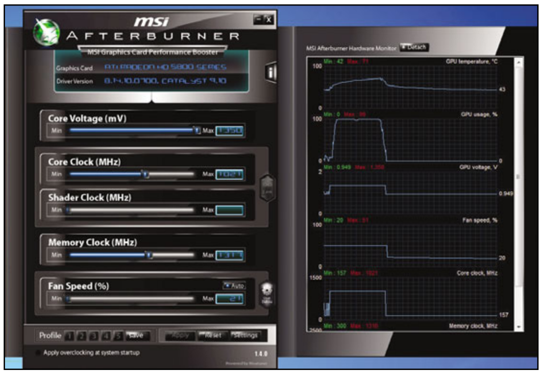
We've covered the basic cooling mods that we performed on the Radeon HD 5870 a few times in the past with other cards, so we won't go in depth again here. We disassembled the card, cleaned off the cheap thermal paste, polished the GPU heatsink's base to a near-mirror finish with some wadding metal polish, applied a high-quality thermal paste, and then reassembled the card.

Although the process was fairly straightforward, you should be aware of a few things if you want to try this mod yourself. The Radeon HD 5870 is encased in a shroud that covers the entire card. To remove it, no fewer than 15 screws of differing sizes have to be removed from the back of the card, four of which are spring-loaded. When removing the screws from the back of the Radeon HD 5870, be careful, take your time, and keep track of each screw's position. If you take your card apart, we want you to be able to put it back together again.

The Soft Mods

With the cooling mods complete, we were ready to tackle the first soft mod—flashing the card's BIOS. In its stock form, overlcocking on the Radeon HD 5870 is limited to peak GPU and memory frequencies of 900MHz and 1,300MHz, respectively. Those limits are set via parameters in the card's BIOS.

However, AMD board partners Asus and MSI have created BIOS versions for their cards that unlock much higher frequencies. GPU and memory frequency options of up to 1,800MHz and 2,600MHz, respectively, are unlocked with MSI's BIOS, for example. And these BIOS files will work on any standard Radeon HD 5870 that's based on AMD's reference design.



MSI's Afterburner GPU tweaking and monitoring utility works with all ATI Radeon HD 5870 cards, not just those built by MSI. With Afterburner, you're able to alter not only GPU and memory frequencies but also the GPU voltage. Using Afterburner, we were able to take our card up to speeds of 1,021MHz and 1,312MHz for the GPU and memory, respectively, after goosing the GPU voltage to 1.35V.

Although Asus and MSI don't make the BIOS files available on their Web sites, the files can be easily found online. (Try rapidshare.com/files/288531683/Asus.rom, for example.) In addition to one of the updated BIOS files, you'll also need a copy of ATI's BIOS Flash utility, ATIFlash, which is available at Techpowerup.com (as of this writing, the latest version is 3.75), and either a bootable floppy or USB flash drive.

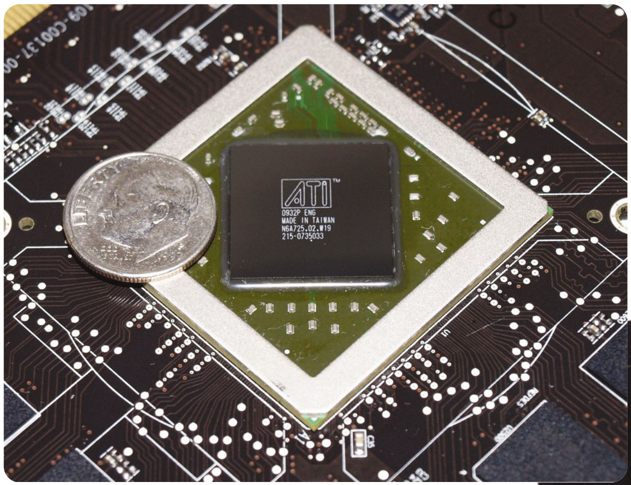
Once you have the BIOS and ATIFlash utility downloaded, copy them to a bootable disk. Restart your computer, and at the DOS prompt, type **atiflash -f -p 0** [**BIOS FILENAME**] (replace BIOS FILENAME with the exact name of the BIOS file you downloaded and drop the brackets) and press ENTER. The BIOS on your Radeon HD 5870 will be updated. Please note the 0 parameter on the command line denotes card 0 in a system. Should your machine have two Radeon HD 5870s, you would flash the second card using the parameter 1.

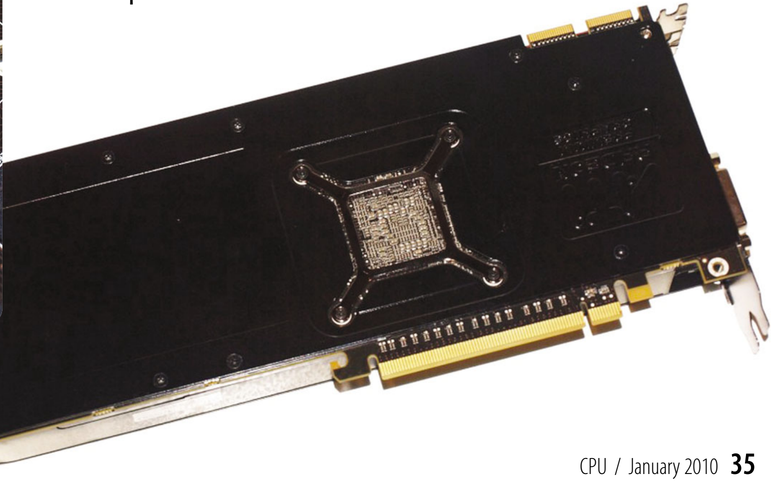
After flashing the BIOS on the Radeon HD 5870 card, restart the system. Windows will likely redetect the card as new hardware and reinstall its drivers automatically. If not, simply reinstall your preferred Catalyst drivers, restart once again, and then go to the Overdrive control panel in the Catalyst Control Center. Click the Unlock button to enable overclocking, and you should now see much higher available peak clock frequencies.

With our new BIOS in place, we moved on to the volt mod and some overclocking. Download a copy of MSI's Afterburner overclocking utility (event.msi.com/vga/afterburner); it'll work with any Radeon HD 5870. (Kudos, MSI!) Install the application and then launch it. You'll notice the very first option at the top of the menu is labeled Core Voltage (mV). This is the option we need to alter to increase the Radeon HD 5870's GPU voltage. By default, the GPU core voltage is set to 1.15V. If you have a quality power supply and good case cooling, it's safe to crank this up to the maximum 1.35V.

With the GPU voltage increased to 1.35V, it's time to start overclocking. Most Radeon HD 5870 cards should have no trouble hitting 925MHz or so with a bump in voltage, so start there and test for stability with a looping benchmark such as 3DMark Vantage. If the card is stable, increase the GPU clock by 10MHz at a time and repeatedly test for stability along the way. We were able to take our particular GPU up to 1,030MHz before encountering some instability, so we backed down the clock in 1MHz increments until we settled on a perfectly stable 1,021MHz.

When you've found a stable GPU clock, move on to the memory overclocking. 1,250MHz is a safe starting point. If that's stable, follow the same procedure, overclocking by 10MHz at a time until you hit the memory's peak. You'll know you've gone too far if your system becomes unstable or performance begins to drop. The Radeon HD 5870 has built-in memory error correction, which helps the card remain stable in the event of





The ATI Radeon HD 5870 is completely encased in a shroud that covers both the front and back sides of the card. Removing the shroud to polish the GPU heatsink's base and apply a high-end thermal paste requires the removal of over a dozen screws of different sizes. Take your time and be sure to keep track of each screw's location.

memory errors. If too many errors are present, performance will suffer even though the card will seem stable. If you begin to experience a decrease in performance while overclocking, dial back the memory clock a few MHz at a time until performance starts to increase again. On our card, 1,317MHz was the peak.

Was It Worth The Effort?

The Radeon HD 5870 is already ultra-fast in its stock form. But with a few minor cooling modifications and little tuning, you can unlock a significant amount of performance. If you're the adventurous type and don't mind fiddling with your graphics card, tweaking the Radeon HD 5870 is absolutely worth the effort. Free performance is never a bad thing, and the Radeon HD 5870 has plenty of it lurking under its ominous heatsink. ▲

by Marco Chiappetta

Performance: Before & After the Mod

We ran a number of popular benchmarks and applications to see how much of an effect modding and overclocking our ATI Radeon HD 5870 card had on its overall performance. We used a powerful Core i7-965-powered test bed for the benchmarks, complete with 6GB of RAM and Windows 7 Ultimate 64-bit edition. Our chart shows the Radeon HD 5870 in several scenarios. We started with the unmodded Radeon HD 5870 running in its stock form; then we overclocked its GPU and memory and tested again. Finally, we overclocked and tested our volt-modded Radeon HD 5870 running the new BIOS.

As the numbers show, there's plenty of performance to be gained by modding and overclocking an ATI Radeon HD 5870, despite its already high stock performance. The new BIOS, GPU volt mods, and cooling enhancements we made to the card let us overclock the card much higher than was possible in its stock form, ultimately resulting in significant performance increases—sometimes as large as 16.6%. We should also note that increasing the GPU voltage via the Afterburner utility enabled us to increase the memory clock higher than when the card was bone stock, most likely because the memory controller was better able to handle the higher frequency with a bit more power at its disposal.

Gaining 171MHz for the GPU and 112MHz for the memory produced performance gains across the board. We saw double-digit improvement in 3DMark Vantage. In every game we tested, regardless of the resolution, performance was increased. Left 4 Dead, which doesn't heavily tax the Radeon HD 5870, showed the smallest increases, followed by the resource-heavy Crysis. Enemy Territory: Quake Wars fell in between these two games.

When all is said and done, the benchmarks clearly show that modding and overclocking the Radeon HD 5870 is absolutely worth the effort. Plenty of power rests dormant, there for the taking (if you don't mind potentially voiding your warranty and putting in the time necessary to find your particular card's optimal frequencies, of course). ▲

	Radeon HD 5870 Stock (GPU clock @ 850MHz, Memory clock @ 1,200MHz)	**Radeon HD 5870 Overclocked (GPU clock @ 890MHz, Memory clock @ 1,290MHz)**	**Radeon HD 5870 Modded, Overclocked (GPU clock @ 1,021MHz, Memory clock @ 1,312MHz)**	**Percent Improvement Over Stock**
3DMark Vantage (Extreme Preset)				
Overall Score	8208	8984	9525	16%
GPU Test 1	25.68	28.23	29.87	16.3%
GPU Test 2	20.84	23.06	24.3	16.6%
Enemy Territory: Quake Wars (4XAA/16XAF, High quality)				
1,920 x 1,200	132.1	137.5	142.9	7.6%
2,560 x 1,600	93.4	97.1	102.5	8.9%
Left 4 Dead (4XAA/16XAF, High quality)				
1,920 x 1,200	123.35	125.26	128.41	3.9%
2,560 x 1,600	103.21	109.67	114.81	10.1%
Crysis (16XAF, High quality)				
1,920 x 1,200	39.59	41.12	42.47	6.8%
2,560 x 1,600	25.01	26.44	28.12	11.1%

Test system specs: CPU: Core i7-965 @ 3.2GHz (Turbo Mode Enabled), Motherboard: Gigabyte GA-EX58-UD5 (X58 Express), Memory: 6GB OCZ DDR3-1333, HD: 10,000rpm WD Raptor 150, Windows 7 Ultimate 64-bit, ATI Catalyst Drivers v9.11b

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PATRIOT

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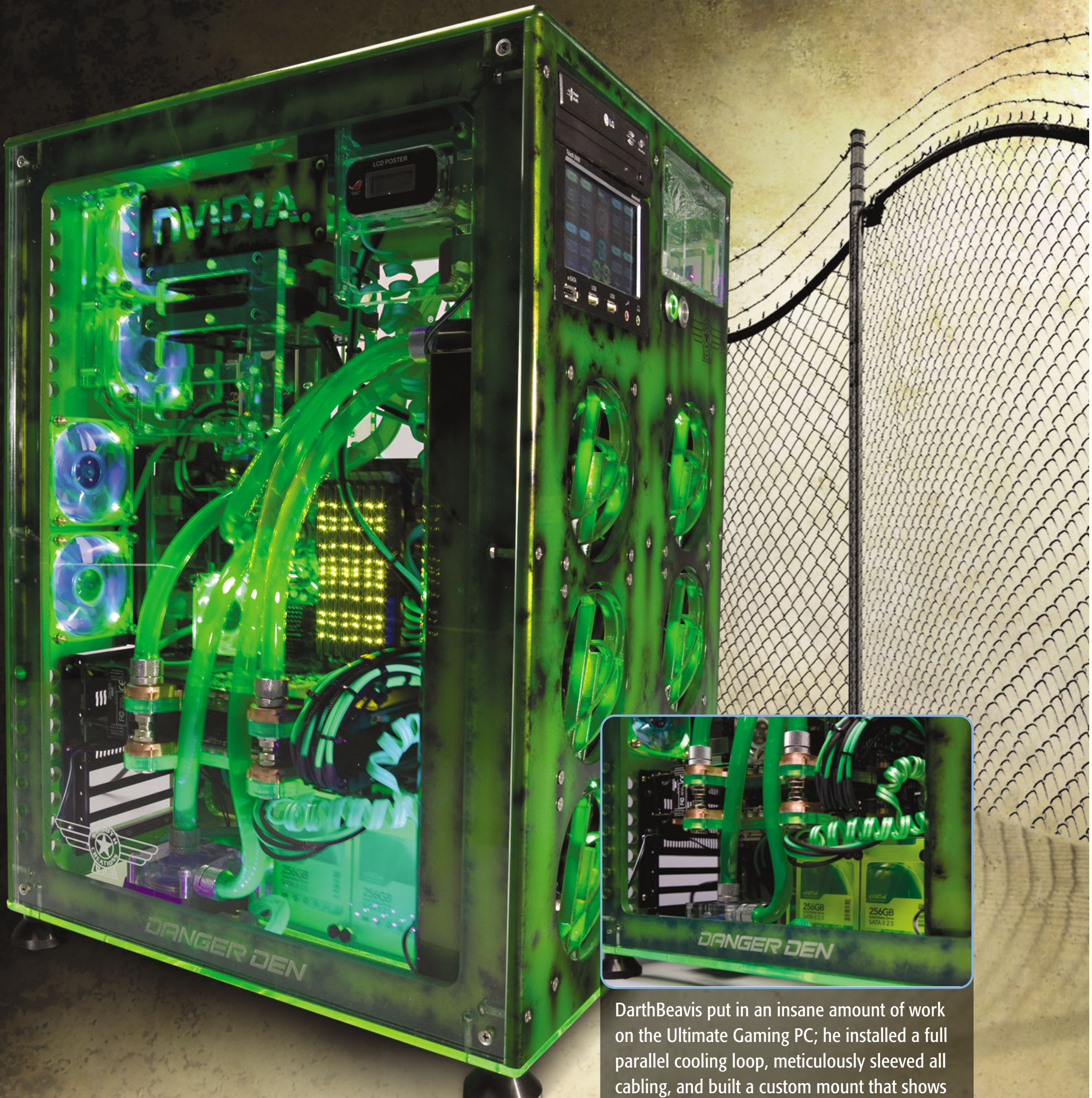
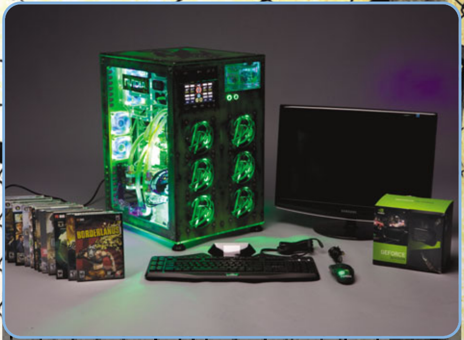
Mad Reader MOD

Ultimate



DarthBeavis put in an insane amount of work on the Ultimate Gaming PC; he installed a full parallel cooling loop, meticulously sleeved all cabling, and built a custom mount that shows off the rig's dual SSDs nicely.

Whether in broad daylight or shadow of night, the UGPC is a sweet-looking computer.



The UGPC isn't just a cool box stuffed with excellent parts; it also came with a Samsung 2233RZ 3D monitor, Nvidia's 3D Vision glasses, a Logitech G19 keyboard, a custom Nvidia-themed Razer Boomslang mouse, and 13 games. For a complete parts list, head to charitycasemod.com.

Smooth Creations' excellent paint work extends all the way to the Silverstone DA1000 PSU.

Richard "DarthBeavis" Surroz is no stranger to these pages, and it's pretty easy to see why. Take, for instance, his latest opus, a monster of a rig he built in conjunction with Nvidia, Intel, Asus, and many other sponsors. The PC doesn't have an official name, but it's been called the Ultimate Gaming PC, and we won't argue.

The build is a project to benefit the Leukemia & Lymphoma Society, and was auctioned off on eBay on November 24 for $5,600.99, which is a steal when you consider everything that went into building it.

The UGPC is a Danger Den Double Wide Tower packed with a brace of GeForce GTX 295s in SLI, a Core i7-975 Extreme Edition CPU, an Asus Rampage II Gene X58 board, 12GB of Crucial Ballistix Tracer DDR3, two 256GB Crucial SSDs, and much more, all bathed in a gorgeous coat of Smooth Creations paint. Surroz had a mere two weeks to complete work on the rig, which is pretty impressive given the to-do list he had.

Surroz sleeved the cabling and set up the Danger Den cooling system in a parallel loop. "I chose an unconventional approach . . . this allowed the tubing to be run in a streamlined manner," Surroz says. "It was also necessary because I added the second GeForce 295 to the loop two days before delivering the PC to Nvidia (without draining any of the coolant from the loop)."

Surroz also built a custom acrylic mount for the SSDs, coiled the SATA cables around a wooden dowel (a trick he learned from fellow PDXLAN modder RAMROD), and installed several case accessories from Performance PCs and the Oznium LED lighting that makes the UGPC look groovy in low lighting.

In addition to all the parts and finish work the sponsors donated to the UGPC project, Surroz threw in his own time, plus a little something extra. When we notified him that he'd won this month's Mad Reader Mod contest, Surroz told us he is donating his prize money to the Leukemia & Lymphoma Society, as well, in honor of Frances Vasquez, a good friend's mother who has Leukemia. This brings the project's total donation to more than $7,000. ▲

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you a $1,500 Newegg.com gift certificate and a one-year subscription to *CPU*.

advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

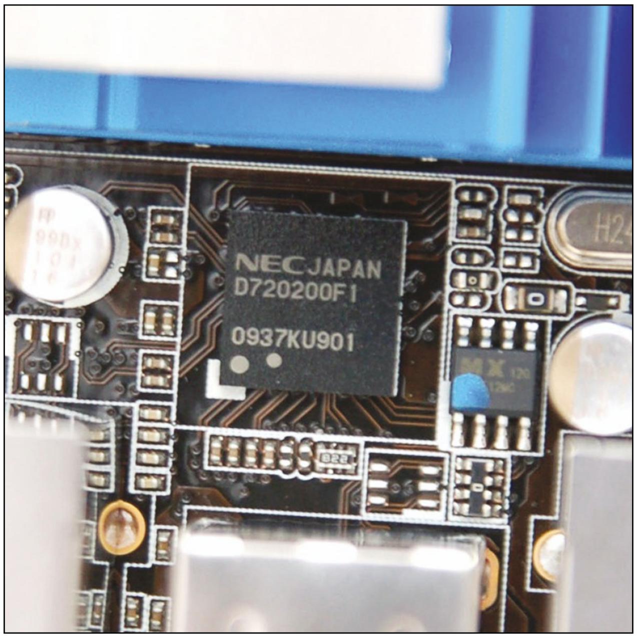
> “. . . Intel’s new Core i7 Mobile processors have some really nice dynamic clock gating features, on a per-core level . . .”

Each month we dig deep into the CPU *mailbag in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*’s “Advanced Q&A Corner” is here for you.*

Charles T. asked: I saw an article online about USB 3.0-capable motherboards and hard drives and have a few questions. I read somewhere that USB 3.0 is about 10 times as fast as USB 2.0, but the USB 3.0 hard drive benchmarks I saw only showed a performance increase of about 5 or 6x depending on the file size. Is this one of those cases where a new technology will never be able to hit its advertised speeds? You know, like AGP 4X vs. AGP 8X, or PCI-E 1.0 vs. 2.0. I ask because I’m in need of some really fast, cheap, removable storage that’ll be compatible with new and old PCs and have been hoping USB 3.0 would be the solution I’ve been waiting for.

My other question is that I heard that Intel is delaying USB 3.0 until around 2011. Is that true?

A: You read correctly that when using its fastest mode, USB 3.0 will offer about 10 times the bandwidth of USB 2.0 (4,800Mbps vs. 480Mbps), Charles. But there are a number of other things that



Although it may be awhile before USB 3.0 support is native to a motherboard’s core logic, third-party discrete USB 3.0 controllers are already in production, such as this one from NEC.

will ultimately have an effect on performance, especially with regard to USB 3.0 hard drive transfer speeds. Remember, no matter how much bandwidth an interface such as USB 3.0 offers, the performance of the actual drive(s) will still limit your transfer speeds. For example, if a USB 3.0 hard drive is connected to a USB 3.0 port that fully supports the fastest 4,800Mbps SuperSpeed mode but the hard drive is only capable of 100Mbps transfer speeds, that 100MBps will be the maximum bandwidth the drive will consume. With that said, it's not likely that future devices will exploit and expose 100% of the bandwidth afforded by USB 3.0, but rest assured devices will be significantly faster than USB 2.0.

To answer your second question, Intel isn't delaying USB 3.0 until 2011, *per se*, but the company's chipsets won't offer native support for the technology until then. That may delay mainstream adoption of USB 3.0, but third parties are at the ready today with discrete controllers and bridges that will be available on motherboards and in peripherals, such as external hard drive enclosures. This hardware should be available by the time you read this.

Jimmy D. asked: **I've heard the buzz surrounding the Core i7 Mobile processor from Intel and think it sounds like complete overkill. I'm in the market for a midrange multimedia notebook but don't want a boat anchor of a machine. I need decent graphics capabilities for some casual real gaming (not just Sims) and the ability to run full 1080p video without having to tether to the wall 15 minutes into the movie. While the Core i7 probably offers a nice performance kicker, I don't need a desktop replacement notebook but certainly can't stand a tiny, emaciated netbook either. I need something in between. Any suggestions?**

A: Jim, there's no question that a notebook processor that is capable of 8-thread multiprocessing (a quad-core with Hyper-Threading) is definitely targeted more toward the power user looking to get more horsepower in a notebook footprint, battery life be damned. However, Intel's new Core i7 Mobile processors have some really nice dynamic clock gating features, on a per-core level, that can save power and preserve battery life when processing workloads don't require much juice. The new chip can completely power down cores if an app is coded only to take advantage of a single- or dual-core processor.

So, in reality, although the onboard processing engines that make up a Core i7 processor offer more performance and collectively will draw more power under a full multithreaded load, these chips have more granular and intelligent power management; they're actually much more power-efficient compared to previous high-end mobile processors.

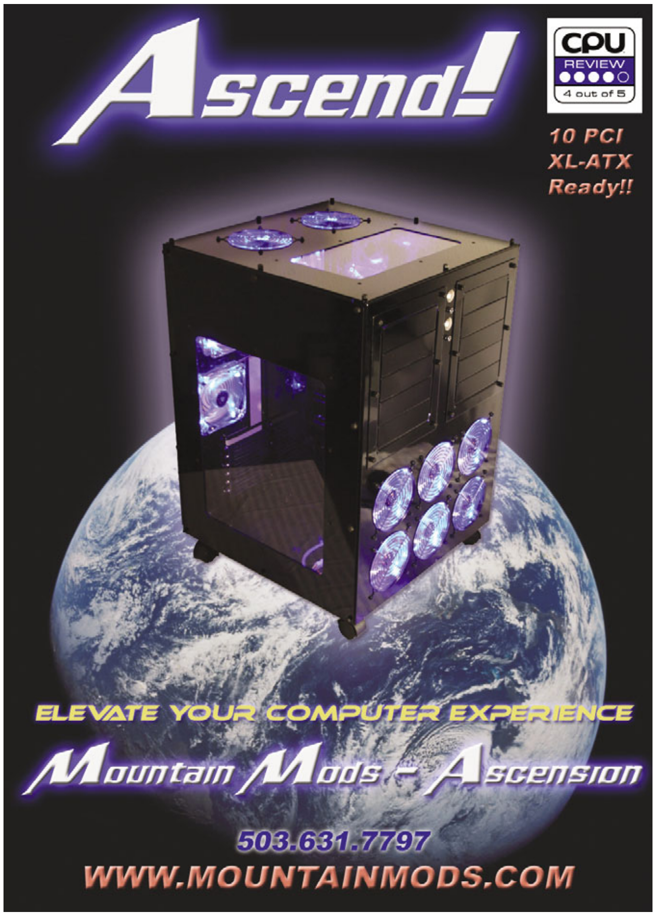
That said, we agree—a full Core i7 for your intended usage may indeed be overkill. The good news is Intel's new Arrandale Core i5 Mobile processor architecture is coming out in January and will have on-chip Intel graphics capable of full HD video decode processing. This Core i5 mobile chip will also be a native quad-core but will be built on Intel's 32nm process for significantly lower power consumption.

Although the chip won't support Hyper-Threading, it will support Intel Turbo Boost clock gating functionality at the core level for additional power savings. And to appeal to your gamer side, the chip will also support an adaptable switching capability that will let the system toggle between integrated graphics and a discrete GPU that might be configured in a number of notebooks from various vendors. Look for notebook product offerings from the usual suspects to start rolling out over the next few weeks and throughout the first quarter of 2010. ▲

The Asus G51J is a high-end gaming notebook based on Intel's new Core i7 mobile processor. It's got game, but battery life was not the primary design objective.

by Dave Altavilla and Marco Chiappetta, the experts over at HotHardware.com.

For bonus content, subscribers can go to www.cpumag.com/cpujan10/q&a.



Ascend!
CPU REVIEW ●●●●○ 4 out of 5
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X-ray Vision: Google Wave

What If Email Were Invented Today?

Google always has been all about making things easy and practical. The Google search engine revolutionized the way people search the Web, but it also requires the simple act of typing a phrase into a text box and clicking Google Search or pressing ENTER. Other Google applications continue that theme, such as Google Earth. (Never has spying on the roof of your neighbor's home been so easy.)

The next major Google application, Google Wave, promises to bring that simple practicality to PC communications in real time over the Internet.

Think of Google Wave as a combination of conversation and document. It will allow people to converse while working together in real time on a document, sharing audio, video, images, and text. Google uses the term "waves" to describe the conversations and collaborations that make up Google Wave.

It can be thought of as the next step in the evolution of email. In fact, Lars Rasmussen, engineering manager at Google, says one of the driving forces behind the development of Wave was this idea: What would email look like if it were invented today?

Current email communications let you share items such as documents and images as attachments, but they are one-way communications—send a message and wait. Google Wave would carry all of the benefits of email, but in real time and with multiple contacts. Thus, it's also possible to think of Google Wave as the hybrid of email, instant messaging, and project management software.

In addition, Google Wave makes managing information easy. For example, you will be able to drag a document from your Desktop into Google Wave, where the document can be embedded into the current conversation.

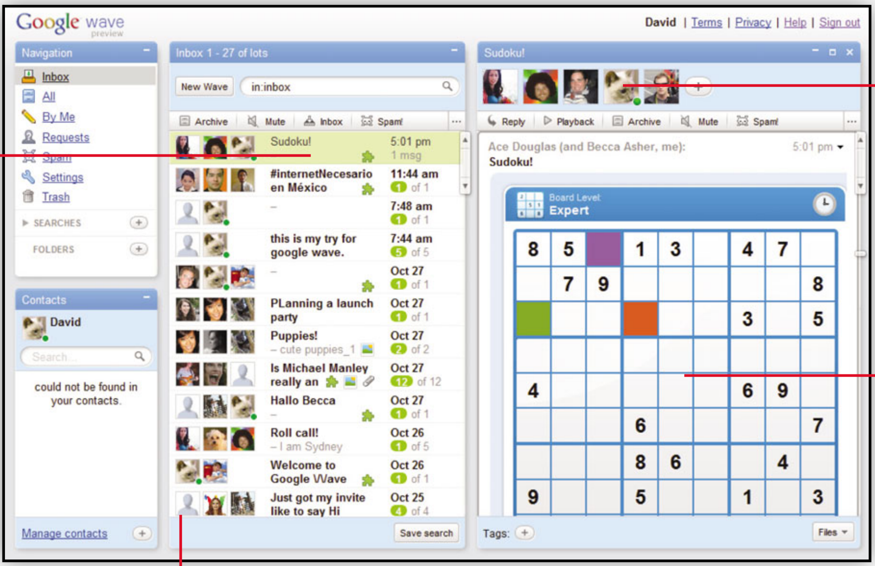
Three Layers Of Wave

Wave consists of three layers: product, platform, and protocol.

Product. The actual Wave product is the Web application that users need to control the waves.

Platform. Through a set of open APIs, developers can embed waves into various

Google Wave Usage Samples



Sudoku! 5:01 pm 1 msg
#internetNecesario en México 11:44 am 1 of 1
– 7:48 am 1 of 1
this is my try for google wave. 7:44 am 5 of 5
– Oct 27 1 of 1
PLanning a launch party Oct 27 1 of 1
Puppies! – cute puppies_1 Oct 27 2 of 2
Is Michael Manley really an Oct 27 12 of 12
Hallo Becca – Oct 27 1 of 1
Roll call! – I am Sydney Oct 26 1 of 5
Welcome to Google Wave Oct 26 1 of 1
Just got my invite like to say Hi Oct 25 4 of 4

Ace Douglas (and Becca Asher, me): 5:01 pm
Sudoku!

8	5	🟪	1	3		4	7	
	7	9						8
🟩			🟧			3		5
4						6	9	
			6					7
			8	6			4	
9			5			1		3

Bolded messages are those with new information.

A green circle on a contact's photo indicates a friend who's online.

You can search through all of your incoming messages and other types of communications through this Wave app.

Through this interactive Sudoku gaming application, your friends can compete with you in a real-time game. When you enter the correct number in the puzzle, you receive points; if you enter an incorrect number, you lose points. As you use this Wave extension, you can see your friends' moves in the different colored squares on the game board. All of the moves occur in real time. (This Sudoku game is one of Wave's featured extensions.)

Source: Google

Web services or add new extensions to already existing waves.

Protocol. The protocol in Wave is the underlying format that allows the real-time communications and that controls the storing and sharing of waves.

Open Source

Google Wave is being built upon an open-source protocol.

"Wave's potential will be orders of magnitude higher as an open technology, rather than a proprietary one," Rasmussen says. "For example, we believe email's ubiquitous success is very much due to it being based on open protocols.

"From a business point of view," he says, "having a smaller portion of a larger pie [with open protocols] is plainly better than having 100% of a smaller [proprietary] one. And open is so much more fun."

Rasmussen says Wave makes use of technological improvements found in HTML5 to provide its benefits. To develop Wave, Google has developed the Google Wave Federation Protocol, which makes use of Operational Transformation. (Operational Transformation, or OT, is a method of supporting collaborative functionalities in groupware systems.)

"OT has been the subject of intense academic and industry research," he says. "We like to think we've added a few significant ideas to the field."

What To Include

Rasmussen says decisions about which applications will be included in Wave are still being discussed. With Wave not yet in beta mode—it's currently in what Rasmussen calls "preview" mode—there's still plenty of time to make decisions on its features.

"One of the great things about Web-based applications is that we're always innovating, building new features, and improving the product," he says. "We plan on continuing to improve Wave, so we may never reach a point where we're done, but there are certainly things we're working hard to implement before we make Wave more broadly available next year."

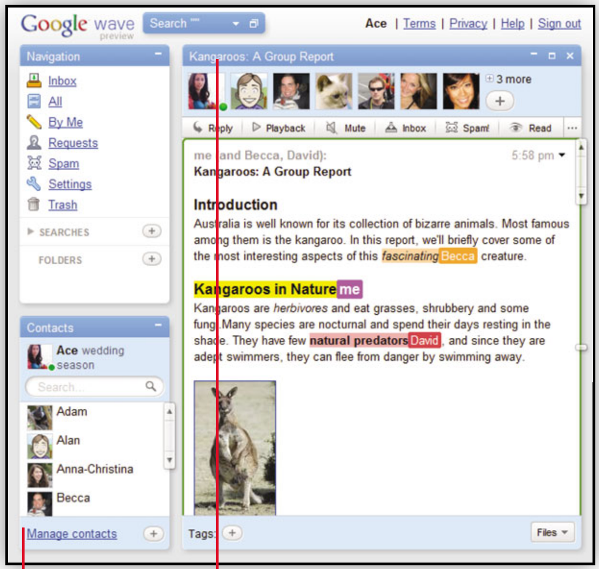
Google Wave might not make computer communications as easy as waving hello to your neighbor, but if it can fulfill its early promise, it may become the closest thing yet. ▲

by Kyle Schurman

Working On Wave

Lars Rasmussen and his brother, Jens, founded a mapping startup company called Where 2 Tech. Their technology eventually became Google Maps. As the Rasmussen brothers worked on Google Maps, they started looking to the future, toward their next project. Jens came up with the idea in 2004 to work on a way to simplify communications. They began working extensively on Wave in 2007.

The project, which the five-person startup team code-named "Walkabout," was developed in Sydney, Australia. The team's work resulted in a demonstration of an early preview of Wave in mid-2009 at Google I/O.



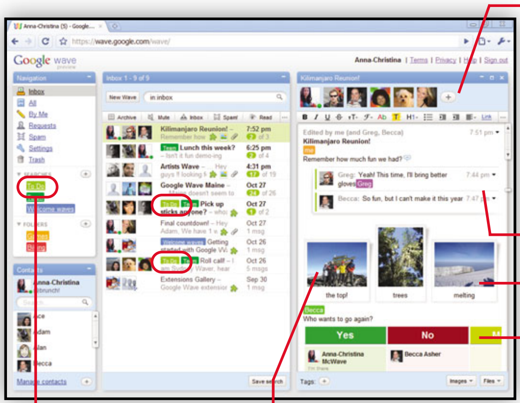
me (and Becca, David): 5:58 pm
Kangaroos: A Group Report

Introduction
Australia is well known for its collection of bizarre animals. Most famous among them is the kangaroo. In this report, we'll briefly cover some of the most interesting aspects of this *fascinating* Becca creature.

Kangaroos in Nature me
Kangaroos are *herbivores* and eat grasses, shrubbery and some fungi.Many species are nocturnal and spend their days resting in the shade. They have few **natural predators** David, and since they are adept swimmers, they can flee from danger by swimming away.

Manage your contacts who have Google Wave accounts through this application.

This group wave provides an opportunity for members to discuss and collaborate on a project, where everyone sees the same content in real time. Changes can be highlighted and attributed to the person who made the changes, as you can see here.



All contacts included in the application are listed here. To add or remove a contact, just drag and add or drag and remove the contact's icon.

Real-time messaging

Photo slide show

Polling

This navigation area lets you manage your communications, manage folders and documents, and perform and manage searches. For example, you can search for any messages that are "to do" items, and those items will be highlighted in the message app (middle of the screen).

When using this photo slide show wave, you also can use a real-time messaging application and a polling application to allow your friends to provide feedback related to the slide show. With the real-time messaging, the messages can be transmitted as you're typing, character by character. The recipient doesn't have to wait until you hit a "Send" button. The conversation can be open to everyone participating in the Wave, or you can limit certain parts of the conversation to certain contacts.

Source: Google

White Paper: Nvidia's Fermi Architecture

First Tesla, Then Graphics

Nvidia's recent announcements regarding its new Fermi GPU architecture were aimed at high-performance computing rather than gaming. However, the new and improved features in Fermi have provided some clues as to what you can expect for future Nvidia GPUs in the gaming arena.

Nvidia announced its Fermi architecture late in 2009, and most of the early discussion surrounding Fermi centered on Tesla, which encompasses Nvidia's HPC (High Performance Computing) products.

Nvidia expects to discuss the Fermi GPU's impact on gaming and 3D graphics, along with detailed information on the Fermi chips' specifications, during CES 2010.

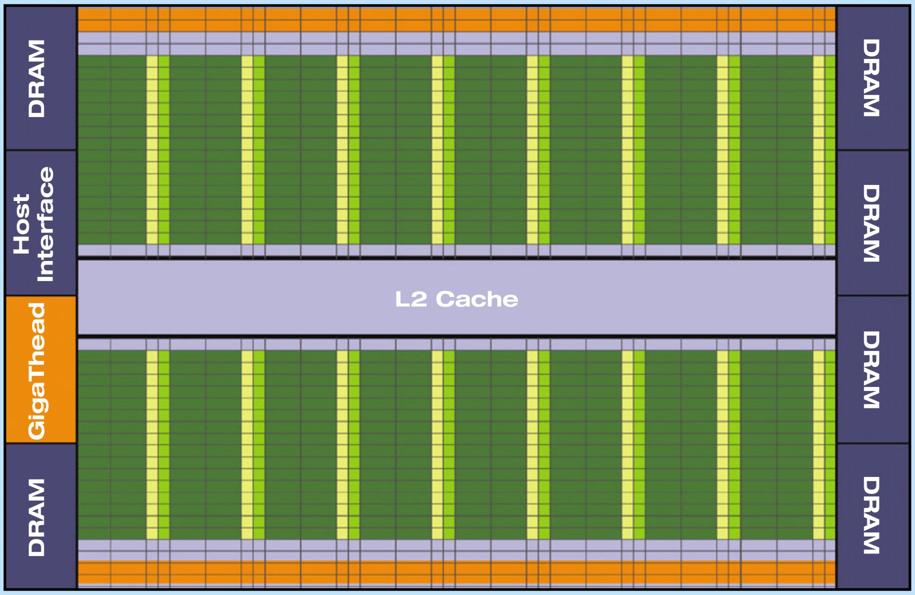
Until then, we'll have to rely on the initial information about Fermi that's related to Tesla and HPC—and there's plenty of it—much of which will translate to consumer-level Fermi GPUs.

Following Fermi

The Fermi GPU promises to continue a trend Nvidia started with the G80 GPU architecture and continued with the GT200: A GPU that treats computing power and graphics power almost equally. Fermi GPUs should feature:

- About 3 billion transistors

Overall Fermi Architecture



Nvidia has not released final specifications on Fermi, but the company has released some important information. Here's some of what is known about the Fermi architecture, along with some estimations based on the known data.

The Fermi GPU contains up to 512 CUDA cores. Each CUDA (Compute Unified Device Architecture) core runs one single precision floating point operation or integer operation per clock per thread. Although Nvidia has not yet announced the final clock frequency expected for Fermi, Insight 64 (a semiconductor industry research firm) estimates it will be about 1.5GHz, giving Fermi a peak operating rate at 1.5TFLOPS.

The 512 CUDA cores are organized within 16 SMs, or streaming processors. Each SM (shown in the "Overall Fermi Architecture" illustration as 16 green columns) contains 32 CUDA cores (also called CUDA processors), four times as many as were included in SMs in previous GPU designs. Within each CUDA core is an integer arithmetic logic unit (listed as INT Unit in the close-up drawing) and a FPU (floating point unit).

The 16 SMs surround a shared L2 cache memory area of 768KB. Each SM includes a warp scheduler and dispatch unit area (orange), the execution units (green), cache areas, and register files (light blue).

Within each SM are four columns (two CUDA core columns, one LD/ST column, one SFU column), consisting of the 32 CUDA cores (marked as "Core" in this illustration), the 16 LD/STs (load/store units), and the four SFUs (special function units). The load/store units support the calculation of source and destination addresses for 16 threads per clock. The SFUs execute particular types of instructions, such as cosine and square root. Each SFU can execute one instruction per thread.

Each SM schedules in groups of 32 parallel threads, called warps. Within each SM are two warp schedulers and two instruction dispatch units. This configuration can execute two warps at the same time, simultaneously occupying two of the four

- Up to 6GB GDDR5 DRAM
- DirectX 11 support
- 512 CUDA cores
- Support for the C++ programming language
- Error Correction Codes (ECC) on the memory interfaces

"Some of these features are also useful for what Nvidia calls 'GPU computing,' the consumer counterpart of HPC," says Tom R. Halfhill, senior analyst for In-Stat's Microprocessor Report.

The new Fermi architecture appears just a few years after the GT200 architecture.

"Nvidia has a history of bringing out aggressive new architectures every three years or so," says David Patterson, professor of computer science at the University of California, Berkeley. "I'm happy to see that they fixed some—but not all—of the problems in making the GPU useful for a wider class of problems."

New Math

Perhaps the most interesting aspect of the new Fermi architecture for HPC will be that it makes use of the latest floating point arithmetic standard from the IEEE , 754-2008, rather than the old standard, called 754-1985. The new standard includes the FMA (fuse multiply-add) instruction. In addition, 32-bit integers for multiply operations will be part of Fermi's ALU (arithmetic logic unit); in the past, the GPU hardware's ALU was limited to 24-bit integers.

FMA instruction is desirable over the previous MAD (multiply-add) instruction because FMA performs both the multiplication and addition in a single final step, which allows for more precise rounding. MAD sometimes caused a loss in precision in the addition step.

Fermi is designed specifically for double precision applications, such as quantum chemistry and linear algebra, which again fit into the push toward HPC. Up to 16 double precision multiply-add operations can be performed per SM per clock, which is about four times what occurred with the GT200 architecture.

Some Frustration

Some people in the gaming community have expressed frustration with

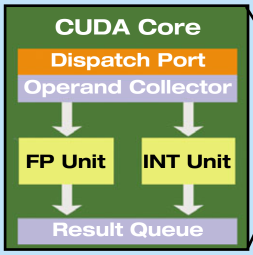
Single SM Architecture

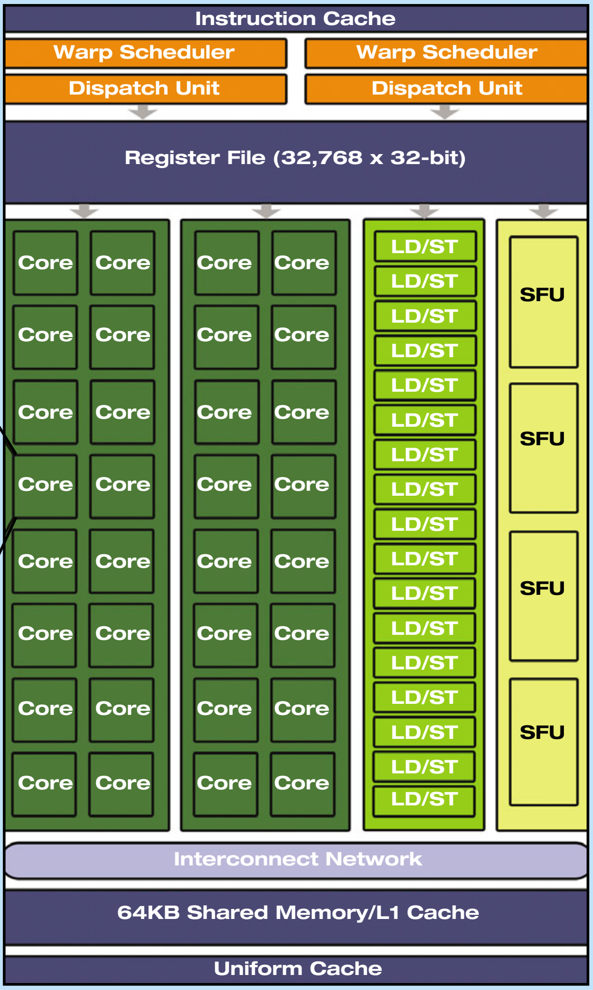
columns. For example, if a 64-point (double precision) floating point instruction is issued, it occupies both CUDA core columns. The other two columns would be empty.

The Fermi GPU includes six 64-bit memory controllers (marked as DRAM on this illustration), which pass the data to the CUDA cores. Each memory controller will support GDDR5 DRAM, making Fermi the first high-end Nvidia GPU to make use of GDDR5. Insight 64 estimates that the aggregate DRAM bandwidth in Fermi will be 192GBps, which would be about 30% more than the eight GDDR3 memory controllers in the GeForce GTX 280. Another benefit of moving from GDDR3 to GDDR5 is that GDDR5 offers a higher bandwidth per pin than GDDR3, meaning Fermi can use a smaller memory interface (Insight 64 estimates a 384-bit interface) than the 512-bit memory interface in the GTX 280. A smaller memory interface requires less operational power and requires fewer pins.

The Host Interface serves as the connection between the GPU and CPU, through a 16-lane PCI-E interface, which should operate at a peak rate of 8GBps.

The GigaThread is a global scheduler that distributes thread blocks to the schedulers in each SM. Within Fermi's GigaThread unit is a GigaThread HTS (Hardware Thread Scheduler). The HTS manages the thousands of threads operating on the GPU, distributing the work to available SMs and managing context switches. By placing the maintenance of scheduling in the hardware through HTS—rather than in the software, as in past configurations—application developers can design software than can run on GPUs with an arbitrary number of SMs. ▲





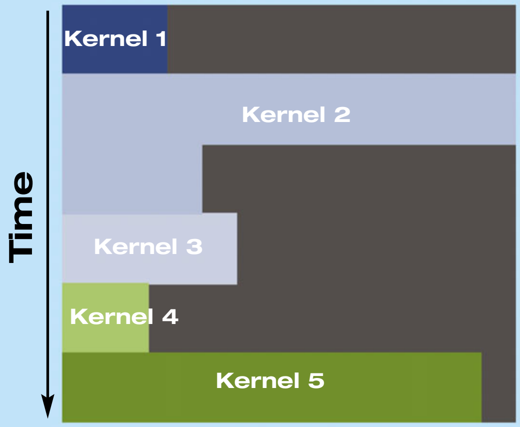
Source: Nvidia

Nvidia's decision to delay discussion of Fermi's graphics capabilities and to focus initially on Tesla and HPC options for Fermi. GPUs for gaming and graphics, obviously, currently drive Nvidia's business, while HPC currently generates only a small part of Nvidia's revenue.

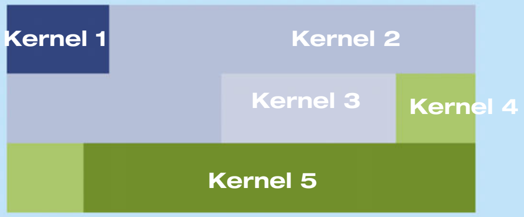
The company is hoping that HPC will eventually grow into a larger revenue producer, but Halfhill says the emphasis on building HPC capabilities into GPUs could force some difficult decisions down the road.

"Looking ahead, I expect Nvidia will continue to innovate aggressively," he says.

GigaThread Thread Scheduler



Serial Kernel Execution



Concurrent Kernel Execution

With the GigaThread thread scheduler in Fermi, a global work distribution engine initially schedules the thread blocks at the chip level, distributing them to the SMs. Then, at the SM level, the warp schedulers distribute warps of up to 32 threads to the execution units. This is a similar process to previous GPU configurations, but Fermi's improvements in GigaThread appear primarily in two areas.

Context switching. The idea of context switching works the same in CPUs and GPUs. Essentially, it's multitasking where each program is granted a piece of time with the processor's resources. Fermi has reduced the amount of time required for the context switch to less than 25 microseconds, improving overall performance.

Concurrent kernel execution (shown above). Under Fermi, if one program must execute a large number of small kernels, all of them can run on the GPU simultaneously, allowing the entire GPU to be better utilized than past GPU configurations, which used serial kernel execution. Context switching also aids with concurrent kernel execution. ▲

Source: Nvidia

IEEE 32-Bit Floating Point Precision

Because computing applications and algorithms all treat GPU memory a little differently, Fermi will be able to configure its memory to meet the needs of an application. Regardless of whether the algorithm or application requires more shared memory or more L1 cache, Fermi can reconfigure its on-chip memory to meet those needs, as the programmer specifies.

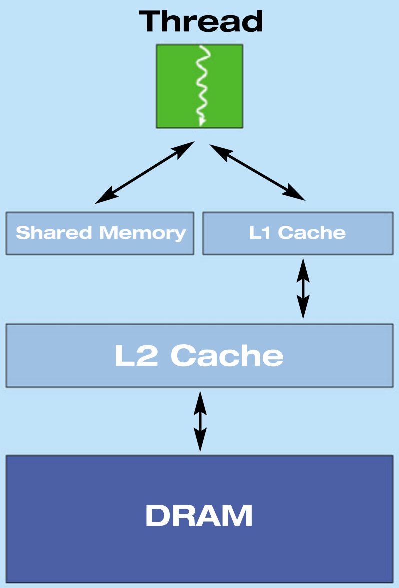
Previous architectures included 16KB of shared memory per SM, but Fermi includes 64KB of on-chip memory per SM that can be configured as a split of 16KB of shared memory and 48KB of L1 cache, or vice versa.

Shared memory. A program that requires extensive use of shared memory could operate up to three times faster, according to Nvidia, because of the possibility of 48KB of shared memory available under Fermi versus 16KB in past configurations. By tripling the amount of shared memory versus previous architectures, certain applications can make use of the additional shared memory as software managed cache, which can provide performance improvements.

L1 cache. For other programs, having up to 48KB of L1 cache memory available will allow them to work more quickly than under previous GPU configurations because the programs won't have to access DRAM as often.

The unified L2 cache under Fermi is 768KB and handles all types of requests (load, store, and texture). ▲

Fermi Memory Hierarchy



Source: Nvidia

"But GPUs may be approaching a fork in the road. At some point, the features designed for HPCs may become a burden for consumer-oriented GPUs. For example, GPUs don't need ECC for games and most other consumer applications.

"Someday, Nvidia may have to design separate GPUs for the HPC and consumer markets. Separate design projects will be more costly for Nvidia and will partly negate the advantage of using the large consumer market to subsidize the development of GPUs for HPC."

GPU vs. CPU

Even if those in the HPC community fully embrace Nvidia Fermi GPUs and the company's Tesla platform, such a migration won't lead to the end of the CPU.

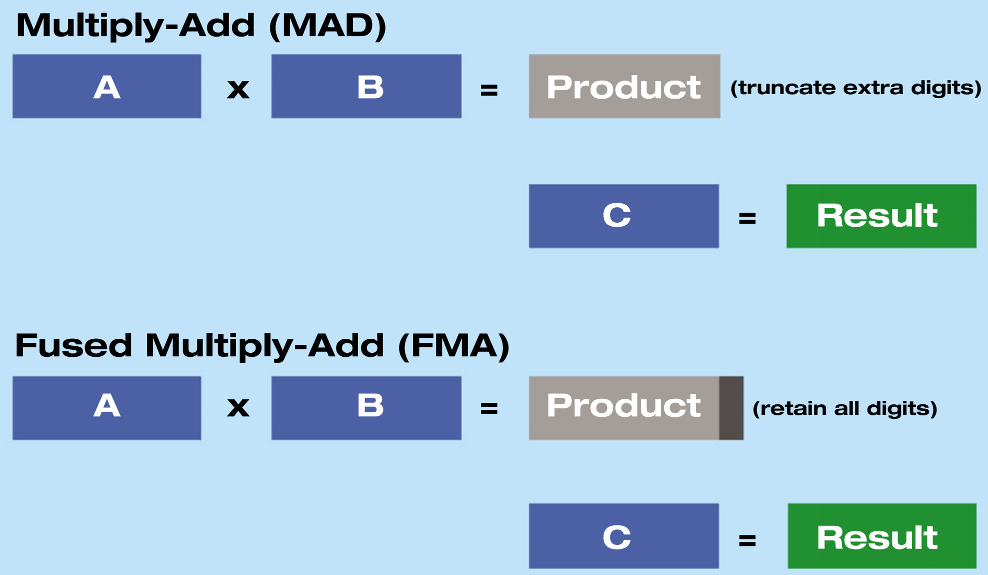
"We're not close to seeing the GPU make the CPU irrelevant," Halfhill says. "The CPU is still king of the system, and it will reign for the foreseeable future. The next step will be integrating the CPU and GPU on the same chip. It has already happened in embedded systems, such as cell phones, and it will happen soon with Intel's Larrabee and AMD's Fusion architectures."

For starters, a CPU has particular advantages, such as with applications that require a limited number of threads or a large mixture of operations. GPUs, meanwhile, excel in applications that require multiple threads with long sequences of instructions. As Patterson notes, GPUs still have some challenges to overcome when compared to CPUs. For example, GPUs must contend with a relatively small amount of GPU memory and an inability to do direct I/O to GPU memory.

"It's not close to making the CPU irrelevant," Patterson says. "There are several weaknesses now, and it's not clear how long it will take to see those weaknesses fixed." ▲

by Kyle Schurman

IEEE 32-Bit Floating Point Precision



Another new feature in Fermi is support for the latest IEEE floating point precision standard, 754-2008. The primary new feature is support for subnormal numbers, which are tiny numbers nearly equal to zero.

The IEEE published 754-2008 in August 2008. The update to the floating point standard was the first since the IEEE released 754-1985 in 1985. The revision process that led to 754-2008 required seven years of work.

Floating point is a system of representing a string of digits that equal a rational number. "Floating" refers to the movement of the decimal point relative to the significant digits in the rational number; you can think of it as scientific notation for computing. The ability of a GPU to perform fast and accurate floating point computations is important in determining the level of performance of the GPU.

Previously, such subnormal numbers were considered to be equal to zero, causing a loss in accuracy. However, the loss in accuracy was tolerated because such numbers were handled in software, sometimes requiring thousands of computational cycles and negatively impacting performance. Fermi now handles subnormal numbers in hardware, leaving no performance issues.

Here's an example for using the new floating point precision in computer graphics.

- A common function involves two operations: Multiplying two numbers and adding a third (A x B + C = Result).
- Previously, the MAD (multiply-add instruction) would perform both operations within a single clock. However, the multiplication result would have to be truncated, sometimes resulting in rounding errors.
- Fermi will instead use the FMA (fused multiply-add instruction), which allows for full precision (no truncation) in the multiplication stage while maintaining its performance level. Algorithms used to render fine intersecting geometry, for example, greatly benefit from the precision in FMA. ▲

Source: Nvidia

THAT'S A WRAP

2009 GIVES WAY TO A NEW DECADE OF TECH PROMISE

50 CHOICE COMPONENTS
AN ENTHUSIAST'S YEAR, IF EVER THERE WAS ONE

58 PINNACLE OF PERIPHERALS
OUR FAVORITE PICKS FOR INPUT & OUTPUT

63 PROGRAMMED TO PERFECTION
THIS YEAR'S BEST APPS

68 COMING IN 2010
YOUR TICKET TO THE TECH HORIZON

Back by popular demand, here's our annual look back at the year that was and the year that's to come tech-wise. First, though, allow us a momentary walk down Nostalgia Blvd. It seems like just yesterday we emerged from our well-stocked bunkers wiping beads of sweat from our brows, relieved that the millennium time bomb prophesized to devastate civilization proved instead a whimpering dud. In a flash, the calendar now reads December 2009 at this writing, and we're readying ourselves to leave the single-digit years of the 2000s behind.

When we launched this thing called *Computer Power User* with the inaugural December 2001 issue, little did we know what advancements awaited us at decade's end. Among the power user-worthy goods we enthusiastically detailed in our initial pages was Intel's 3.5GHz Pentium 4, sporting a new feature called Hyper-Threading, and Nvidia's high-end GeForce3 Titanium 500, offering a whopping 64MB memory. Our hardware reviews included the 867MHz Apple PowerMac G4 priced at a cool $3,098—monitor included, thank you. We praised the novice-centric $699 Canon PowerShot S300 Digital Elph with its 2.1MP resolution and 8MB bundled CompactFlash card, which held a whole seven photos at the lowest compression setting. Kodak's mc3 "multimedia pocket player," meanwhile, combined a digicam, video recorder, and MP3 player into one body that accepted a top-end 96MB CompactFlash card worthy of roughly six entire minutes of video.

Back then, our monthly "Dream Hardware" article, which touts the biggest and baddest tech goodies on the planet, was called "Extreme Hardware"; it had us barking at Sony's AIBO ERS-311 Latte and ERS-312 Macaron robotic pups, each a mere $850. We also marveled at Maxtor's $399.95 160GB UltraATA/133 DiamondMax D540X and Seagate's $1,800 181GB Barracuda 180 SCSI drives. We gushed about Kyrotech's active-cooled SYS Cold-Fusion PC with SuperG2 fridge in the case's base, a system that would have cost you $3,488 but included a 1.86GHz Athlon. In our first "At Your Leisure" entry, meanwhile, we went gaga over Madden NFL 2002, Max Payne, and a new doohickey from Microsoft called the Xbox.

The Time Is Now

So much for the past; fast-forward to today. Intel and AMD are still duking it out, although Intel agreed to shell out $1 billion-plus to AMD to settle antitrust allegations, and AMD's chips now come from its manufacturing spin-off GlobalFoundries. Apple recently gave Mac OS X-system cloner Psystar a good spanking in court; the iPhone 3GS is the mobile world's current darling; and Steve Jobs was dubbed *Fortune's* CEO of The Decade after retaking Apple's steering wheel yet again. The Xbox 360 is evidence of society's current fascination with all things social networking with its Facebook and Twitter integration. The PS3 is enjoying a rebirth of sorts with a new look, pricing, and Netflix streaming, while the Wii, well, is stagnating before our eyes.

But it's processors, motherboards, chipsets, video cards, memory kits, SSDs, HDDs, security apps, media managers, LCDs, NAS devices, and other high-end gear you're most interested in. Hence, as with past years, we've compiled our favorite PC components, peripherals, and software of 2009 for your review, detailing our overall favorites, plus a couple runner-ups, in numerous subcategories. Additionally, we give 2009 a sendoff in our "What's Next?" article that offers a peek at what to watch for in the months to come.

If 2009 is any indication, 2010 should an exciting, turbulent, and glorious time. After all, in the past year Yahoo! bowed at the altar of Microsoft search, and Bing banged on Google's front door. Windows 7 kicked Vista to the curb, Google promised a Chrome OS future, and Internet Explorer lost more ground to Firefox. "Cloud computing" became less mysterious. The Pirate Bay tied anchor, possibly for good. Netbooks stuck out their collective tongue at cynics. Ebooks dropped from the sky like rain. Mobile apps and touchscreens multiplied like bunnies. CompuServe faded to black. Domain names added a dash of international flavor. Internet video forever altered TV. Unix turned 40.

Here's to 2009 and the years that proceeded it. More importantly, here's to 2010 and what awaits. The ride will be anything but dull, so stick around. ▲

by Blaine Flamig

CHOICE COMPONENTS

AN ENTHUSIAST'S YEAR, IF EVER THERE WAS ONE

No matter how much money you spent on computer hardware, 2009 was an amazing year for power users. New CPU and GPU architectures paved the way for high-end enthusiast gear. Derivative designs trickled down from there, giving more value-oriented buyers access to the same advancements. And a shift from 55 and 65nm manufacturing to 40 and 45nm nodes opened up headroom for overclocking the components most likely to impact system performance.

Accordingly, the need for speed became much more affordable. Technologies such as Intel's Turbo Boost, which ramps up clock rates in response to lightweight loads, more intelligently addressed the varying ways we use our machines. Clock gating and voltage throttling helped the highest-end hardware, such as ATI's Radeon HD 5870, hit astoundingly low idle power consumption numbers, too. Amazingly, enthusiasts were able to break benchmark records and promote energy efficiency with the same core components.

With the exception of Seagate's Barracuda XT 2TB, whose price we quoted from Amazon.com, all prices reflect the current Newegg.com price at the time of this writing.

Processors

Although the two dominant CPU vendors took different paths in 2009, neither will end the year very far from where it started. Intel maintains its vise grip on the affluent enthusiast market, while AMD continues launching more affordable models in the Athlon II and Phenom II lineups with dual-, triple-, and quad-core variations.

The big news for Intel was, of course, the distillation of its Nehalem microarchitecture into Core i5 and Core i7 for LGA-1156. The more mainstream socket is less complex than LGA 1366, yet the CPUs that drop into it include dual-channel memory controllers and 16 lanes of PCI-E 2.0 connectivity built onto the processing die itself. The i7s maintain Hyper-Threading support (meaning quad-core chips can work on up to eight threads at a time) and an aggressive Turbo Boost implementation. The lone Core i5 doesn't include Hyper-Threading. Both models are extremely quick, though, despite their midrange billing.

AMD made its 45nm desktop debut in January with the Phenom II—a processor family that effectively did battle against Intel's Core 2 Quads, coming up short against the Hyper-Threading- and Turbo Boost-equipped Core i7s. Since then, we've seen AMD launch dual- and triple-core variants of the same architecture, in addition to even lower-priced products with no shared L3 cache.

Winner: Intel Core i5-750

$199.99; www.intel.com

Given Intel's performance leadership throughout 2009, our favorite CPU was bound to come from that company's fleet. But our choice of the Core i5-750 is not only a result of the Nehalem architecture's performance but also of the chip's sub-$200 price.

By default, the Core i5-750 runs at 2.66GHz. However, the chip's implementation of Turbo Boost lets it operate at up to 3.2GHz when only a single thread is active. By intelligently balancing clock rate with the software load, Intel's sole Core i5 establishes itself as a smarter CPU than the Core 2 Quads it displaces. The only notable feature you sacrifice in going with the cost-conscious Core i5 is Hyper-Threading, meaning the chip addresses as many as four threads, rather than eight, simultaneously.

Because the Core i5-750 centers on a now mature 45nm manufacturing process, it tends to overclock fairly readily, too. Your mileage will naturally vary, but we've run our sample up to 4GHz at 1.45V on air.

First Runner-Up: Intel Core i7-920

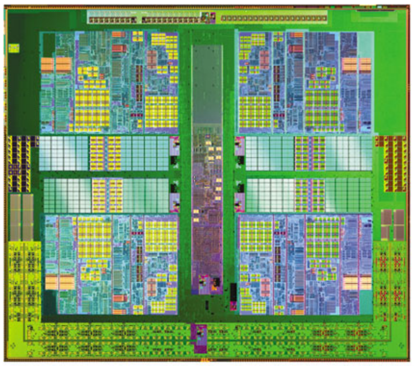
$288.99; www.intel.com

If the thought of losing Hyper-Threading support is too much for you to handle (and if you do a lot of video encoding, it just might), it'd be hard to go wrong with Intel's Core i7-920. The LGA 1366-based processor is more expensive than our top choice, and its accompanying platform will also cost about $100 extra on average.

But the addition of Hyper-Threading and a triple-channel memory controller gives the Core i7-920 a little more kick than the Core i5. Moreover, because LGA 1366-based CPUs don't include on-die PCI-E connectivity (instead relying on the X58 chipset with 36 lanes of PCI-E), it's possible to build more intricate graphics subsystems without running into an interface bottleneck. As you might expect, this 45nm Nehalem-based chip is also an eager overclocker with the right motherboard. Consistent with other Nehalem-based processors manufactured using Intel's 45nm process, we've seen these chips hitting anywhere from 4 to 4.2GHz with only minor voltage increases.

Second Runner-Up: AMD Athlon II X4 620

$99; www.amd.com



AMD might not be wearing the performance crown right now, but it still sells a number of CPUs with power user appeal. The company's Athlon II X4 620 represents one of the easiest ways we know of to get four cores of fury under your machine's hood for less than $100.

How has AMD managed to pull down the price of quad-core computing so significantly? By cutting back on cache. As with all of the other Athlon II models, the X4 620 has no L3 cache at all. And whereas the Athlon II X2s have 1MB of L2 cache per core, the CPU we're recommending only features 512KB per core. What results is a relatively small processor consisting of 300 million transistors and manufactured on GlobalFoundries' 45nm node. Running at 2.6GHz, the Athlon II X4 620 is almost as quick as a Phenom II at the same frequency, but it's even more affordable. Rated at 95W TDP, we think this CPU works well in an office desktop or budget gaming system.

Motherboards

Chipsets and motherboards might not be particularly sexy, but dropping your processor of choice into a complementary platform is a critical part of building a balanced machine. The three CPUs we've recommended utilize different socket interfaces. They also work with core logic designed to address several price points, resulting in dissimilar feature sets. Is it any surprise, then, that our favorite motherboards for 2009 are as varied as the processors that they support?

Winner: Gigabyte P55A-UD6

$249.99; www.gigabyte.us

The P55 Express is Intel's mainstream chipset, designed to support Core i7 and Core i5 processors through an LGA 1156 interface. You can find P55 Express-based motherboards for less

than $100, but our top choice is the flagship of Gigabyte's line: the $250 P55A-UD6. We picked the P55A-UD6 because, first and foremost, it accommodates the Core i5-750. But the board also includes a couple of features that Intel just didn't have time to build into its P55 chipset.

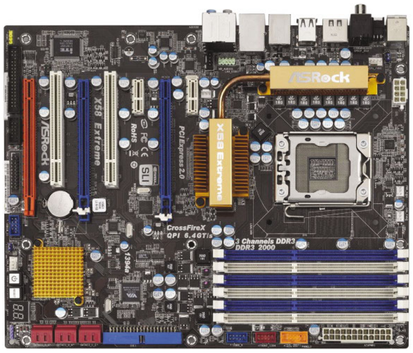
The first is SATA 6Gbps support, complements of an onboard Marvell controller. Now let's be straight here: You won't see the benefit of additional storage throughput if you're using mechanical hard drives. It'll take the next generation of compatible SSDs to show what a faster interface can do. But Intel isn't planning on adding 6Gbps support to its chipset lineup any time soon, so Gigabyte's inclusion of the technology is a nice touch.

An NEC USB 3.0 controller also figured favorably into our decision. The jump from USB 2.0 (480Mbps) to USB 3.0 (5Gbps) is massive, and anyone who buys an external drive in 2010 will want to keep the quicker peripheral connection in mind.

Both high-bandwidth extras do add a slight complication. Because they're tied into the processor's integrated PCI-E links, enabling 6Gbps SATA and USB 3.0 drops the primary graphics card slot to x8 signaling speeds and disables the secondary slot. Go with a fast single-card graphics card, though, and you won't have any trouble getting great performance from this board.

First Runner-Up: ASRock X58 Extreme

$169.99; www.asrock.com



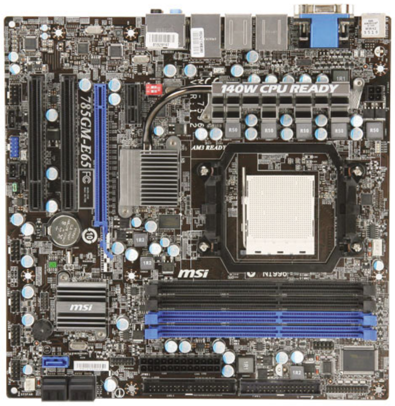
Intel's venerable Core i7-920 was one of three Bloomfield processors that Intel launched toward the end of 2008. At the time, X58-based motherboards were in the $300 range, making the platform inaccessible for many power users. But now you can buy solidly built, high-performance X58 motherboards for roughly half of that. ASRock's X58 Extreme effectively exposes the functionality built into Intel's flagship chipset and it costs right around $170.

Perhaps most notable are the X58 Extreme's three PCI-E x16 slots, two of which offer full x16 connectivity for SLI and CrossFire graphics configurations. The third is electrically wired for four lanes, but will take a third video card if you simply want to add a couple more monitors.

Enthusiasts looking to maximize gaming performance can save money by overclocking a Core i7-920, buying ASRock's X58 Extreme, and then diverting funds to high-end graphics. A comprehensive BIOS with solid overclocking capabilities makes this relatively inexpensive motherboard a solid enthusiast buy.

Second Runner-Up: MSI 785GM-E65

$89.99; www.msicomputer.com



An affordable quad-core processor deserves a similarly value-oriented motherboard. MSI's 785GM-E65 centers on AMD's modern 785G chipset and sells for less than $100. That's what we'd call a match made in heaven.

The microATX platform is physically diminutive. However, its feature list is distinguished. Integrated Radeon HD 4200 graphics are complemented by 128MB of side-port memory. Of course, you can't expect onboard graphics to cut through the latest games; the 785GM-E65's 16-lane PCI Express 2.0 PEG slot for discrete graphics cards should do the trick. FireWire, eSATA, and a Realtek HD Audio codec help round the board out.

Of the three motherboard recommendations we've made, the 785GM-E65 is the most versatile. Solid specifications make the 785GM-E65/Athlon II X4 620 combination great in an office environment. Copious upgradability works well for gaming. And its small size is ideal in HTPC applications.

Graphics Cards

Motherboards, memory, and processors are all key components in a power user's machine. Graphics, however, are the lynchpin of a truly capable system. Increasingly, the capabilities of your GPU have an impact on your overall system performance. Gaming, of course, is defined by graphics processing. However, Blu-ray playback acceleration, video encoding, and physics are increasingly being pushed toward GPUs, as well.

In 2009 we saw DirectX 10.1-class GPUs from ATI give way to DX11 and Windows 7. Nvidia introduced DX10.1-compatible chips for mainstream buyers but closes the year out with no immediate answer to ATI's aggressive Evergreen family debut. Both ATI and Nvidia launched products based on 40nm manufacturing from Taiwanese foundry TSMC, though TSMC continues to struggle with yields on its newest node.

Winner: AMD ATI Radeon HD 5870 1GB

$409; www.amd.com

After several years of trailing Nvidia's best-performing graphics processors, ATI finally introduced a GPU able to

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outclass its competition's flagship. The Radeon HD 5870 centers on ATI's Cypress GPU, which sports an astounding 1,600 shader processors, 80 texture units, and 32 render back-ends, all on a 2.15 billion-transistor ASIC rated for 2.72Tflops of compute muscle.

Those raw specs translate into impressive gaming performance. In most applications, ATI's fastest single-GPU card is nimbler than Nvidia's equivalent. It's also less expensive. Plus, it consumes less power at idle and load than the GeForce GTX 285. Those three measures are the most conventional benchmarks by which graphics cards are measured, and the Radeon HD 5870 wins them all.

But the card has another trio of tricks up its sleeve. To begin, it includes a display output technology that ATI calls Eyefinity. There's actually a lot of substance behind the marketing name. In essence, the Radeon HD 5870 offers four display outputs: two dual-link DVI connectors, HDMI, and DisplayPort. By utilizing DisplayPort and any two of the other connections, the card supports a total of three simultaneous outputs that you can use to game across three displays.

The Radeon HD 5870 is also ATI's first DirectX 11-compatible card. Though it might seem like a checkbox feature today, DX11 will play an increasingly important role as software developers take advantage of the new API. Already, ATI has enabled GPU-accelerated drag-and-drop transcoding in Win7 through DirectCompute. A handful of DX11-capable games show that software developers are more serious about this generation's graphics than they were about DirectX 10.1.

Finally, the Radeon HD 5870 is able to bitstream the high-definition soundtracks found on Blu-ray movies. In other words, you can connect the card via HDMI to your stereo receiver and send the Dolby TrueHD and DTS-HD Master Audio formats straight across for decoding. That feature would have required a $200 sound card upgrade in the past.

First Runner-Up: Nvidia GeForce GTX 295

$519; www.nvidia.com

Although ATI launched its Radeon HD 5970 at the very end of 2009, releasing the fastest graphics card ever seen, Nvidia's GeForce GTX 295 held that honor for the 11 months prior. The secret to the GTX 295's blazing speed was a pair of GT200b processors crammed into a single dual-slot card, yielding SLI-on-a-card.

Priced at $500, the GeForce GTX 295 remains a niche offering aimed at enthusiasts willing to spend top dollar on the fastest add-in card that Nvidia sells, whether it's for a more immersive experience with PhysX enabled, playing in stereoscopic mode using GeForce 3D Vision, or simply enjoying playable frame rates in the latest games with detail settings cranked up.

Second Runner-Up: ATI Radeon HD 5770 1GB

$164; www.amd.com

ATI launched five products between September and November of 2009, due in large part to the company's "sweet spot" strategy. Its engineers designed one high-end (but not overly complex) GPU, which they used to drive the Radeon HD 5870 and 5850. Blueprint in hand, those engineers built even faster graphics cards by putting two Cypress processors on a single PCB, resulting in the Radeon HD 5970, and more mainstream boards by scaling-down the original design. ATI's Radeon HD 5770 centers on one of those derivative architectures. In fact, the Radeon HD 5770 is exactly one half of our top board for 2009, the Radeon HD 5870. Instead of 1,600 shader processors, it sports 800. Rather than 80 texture units, it boasts 40, and so on.

But even though the Radeon HD 5770 can't live up to the 5870's gaming performance, it's still an exciting piece of hardware. DX 11, Eyefinity, and bitstreaming support are all part of the package, as is 1GB of GDDR5 memory. Even more so than ATI's flagship, the Radeon HD 5770 is ideal for a home theater because its idle power consumption is a very modest 18W. And with a price tag around $170, this pick is much more affordable than our other performance-driven choices.

Storage Devices

Toward the end of 2008, experts from Intel's performance lab spent some time talking to the press about benchmarking Core i7. Storage turned out to be a particularly important topic because the new architecture would purportedly be bottlenecked by mechanical hard drives. Thus, Intel recommended testing the Core i7 processors in systems with solid-state storage. Back then, a handful of SSDs offered strong, consistent throughput. Many others were downright dismal performers. But in 2009, SSDs evolved to a point where many (if not most) were trouble-free.

Even today, flash-based storage technology remains exorbitantly expensive and comparatively low-capacity vs. conventional hard drives. But don't expect magnetic disks to go anywhere soon—they remain the most affordable way to pack an enthusiast machine with mountains of space for data.

Winner: Intel X25-M 160GB SSD

$599.99; www.intel.com

Sometimes it's difficult to balance lofty price tags with exciting benchmark results. But in the case of Intel's X25-M, there is such a significant experiential speed-up to be had by upgrading from a

hard drive to this SSD that our 2009 recommendation is an easy one.

The benefits of Intel's X25-M are fairly well-chronicled. First and foremost, it serves up impressive performance—single-drive sequential read speeds that push the capabilities of a SATA 3Gbps interface and sequential writes approaching 100MBps. Random reads and writes is where this second-generation drive really shines, though, exceeding the performance of even Intel's own SLC-based X25-E.

On top of its throughput, the X25-M boasts incredibly low power consumption, 1,500G shock resistance, and a lengthy 1.2 million-hour MTBF rating. At 160GB, this is also the highest-capacity drive Intel sells. Now, most power users have a lot more data than that, so we'd recommend using the X25-M as part of a larger storage subsystem, perhaps in conjunction with our second recommendation. However, as a boot/application drive, you'll have a hard time beating the performance Intel offers, at least until 6Gbps SSD controllers start emerging in 2010.

First Runner-Up: Seagate Barracuda XT 2TB

$310; www.seagate.com

Speaking of 6Gbps storage, Seagate's Barracuda XT is the first hard drive with native support for the faster signaling rate. Ironically, the mechanical disk doesn't move enough data to truly show off the benefits of next-gen SATA. Nevertheless, it sports plenty of other features that help accelerate performance more than Seagate's preceding Barracuda offerings. For instance, 347 gigabits per square inch of areal density is the greatest ever offered. And, of course, higher areal density means more bits per unit of area, which turns into increased throughput. A 7,200rpm spindle and 64MB of data cache help maximize read and write speed, as well.

But the real reason to ogle Seagate's newest hard drive is its 2TB capacity. In a world of 50GB Blu-ray images, massive music collections, and DVD-based games, there's really no such thing as having too much storage (so long as you're able to keep the most important information backed up, that is). Although we wouldn't consider it inexpensive at $300+, the Barracuda XT still makes capacity available at a much lower cost per gigabyte than any SSD can come close to matching.

Second Runner-Up: OCZ Vertex Turbo 120GB

$599; www.ocztechnology.com

When Intel launched its first-generation SSDs, the company enabled some of the fastest read speeds ever seen, butting up against the practical limits of 3Gbps SATA. But it didn't always record the quickest writes. And as we've already mentioned, the competition really heated up in 2009.

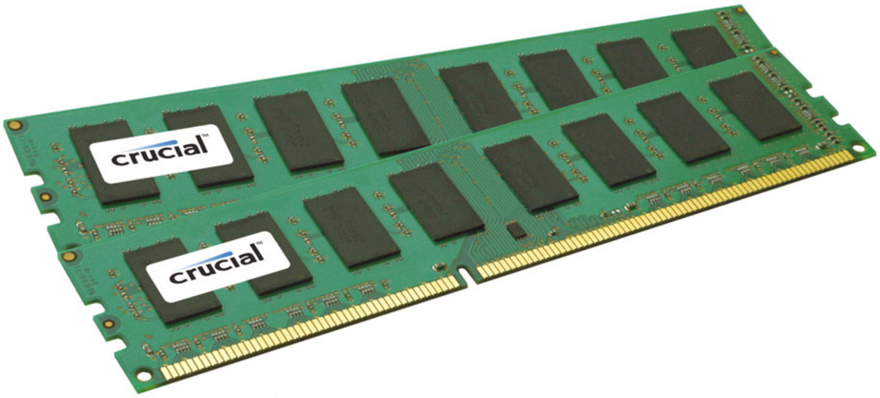
A previously unknown vendor named Indilinx hit the scene midway through the year with its ARM-based Barefoot controller. Several SSD manufacturers adopted the controller, using it to go up against Intel's X25-M.

OCZ was one of Indilinx's closest partners, which earned OCZ access to specially-binned parts that run at 180MHz instead of 166MHz. The small speed bump translates to an even smaller performance increase, but it's there. And simply moving to the Indilinx controller results in a massive sequential write speed increase vs. any of OCZ's previous MLC-based drives. The SSD crown still rests with Intel, but the Vertex Turbo 120GB serves as a very compelling alternative.

Memory

Between the beginning and end of 2009, both Intel and AMD made a synchronized shift away from DDR2 and toward DDR3. Intel pushed harder, of course, having already launched its DDR3-only Core i7s and a handful of Core 2-class chipsets with DDR3 support built-in.

But it was AMD's Socket AM3 debut in February that really made the technology accessible to a broad audience. Before that, only Intel's priciest enthusiast platforms employed DDR3. Thankfully, prices on the modern memory technology have since come down drastically; you'll find plenty of 4GB kits for less than $90.



Now that everyone is shopping for the same type of memory, the key memory debate moves to whether it's better to buy high-frequency or low-latency RAM. Not surprisingly, there are legitimate reasons to go either way.

Winner: Crucial 4GB (2x 2GB) DDR3 PC3-10600 CAS9 Kit

$88.99; www.crucial.com

At the end of the day, you don't have to break the bank to realize excellent memory performance with an Intel Core i5-based build. The processor's integrated memory controller is officially rated to work at speeds as high as DDR3-1333, and in a dual-channel configuration it's able to push more than 17GBps of measurable bandwidth running inside that specification—more than enough to prevent a bottleneck.

With an advertised combination of DDR-1333 performance at CAS 9 timings, Crucial's CT2KIT25664BA1339 kit becomes a play on value, because it sells for less than $90. However, the bare modules set to run at a JEDEC-standard 1.5V betray this kit's overclocking potential. At 1.65V, the highest setting Intel's memory controller is said to safely support, we surpassed DDR3-1900 data rates. That's proof positive that you don't necessarily need an expensive RAM kit slathered with heat spreaders in order to hit lofty clock rates.

We'd say that Crucial's kit is about as generic as you can get, but that might sound derogatory when we mean it to be a compliment. Within the specs of Intel's Core i5, running at low voltages, and devoid of passive coolers, it's certainly nice to pay a low price for mainstream hardware that yields enthusiast-class headroom.

First Runner-Up: Corsair Dominator 6GB DDR3-2000 CAS 8 Kit

$379.99; www.corsair.com

For some folks, the joy of being a power user comes from saving money on midrange gear and tweaking it up to more extreme performance levels. For others, it's not a problem to buy the best of the best—usually the components screened for optimal headroom—and make that hardware run even faster. Corsair's 6GB DDR3-2000 Dominator kit (CMG6GX3M3A2000C8) is best suited to enthusiasts in that latter category for a number of different reasons.

To begin, there currently aren't any processors or chipsets with memory controllers rated for DDR3-2000 data rates. Getting the most out of these modules means you're prepared to do some BCLK overclocking. Incidentally, that's exactly what you'd be looking at with a Core i7-920 on an X58-based motherboard and a triple-channel memory kit like this one.

In addition to its three matched 2GB modules, Corsair also bundles a two-fan cooler able to move more air across the modules' extra-large fins. The only caveat here is a $379.99 price tag, which adds up to a fairly significant premium to memory that's guaranteed to overclock well.

Second Runner-Up: Super Talent Pico_C

$88.99; www.supertalent.com

With DDR3 now the dominant system memory technology and the mainstream/high-end bases covered with our respective Crucial and Corsair recommendations, we wanted to highlight a storage device that could serve double duty, augmenting the memory performance of, say, a laptop or netbook.

After falling in love with Super Talent's Pico_C last year, we were happy to see the company follow up with a 32GB model using the same form factor in 2009. The Pico_C's capacity isn't what makes it so cool; there are already 128GB flash drives out there dwarfing this unit's space. Rather, it's the fact that so much information fits on a device that weighs less than six grams. Of course, you can plug the Pico_C into your portable of choice running Win7 or Vista and enable ReadyBoost. It's powered by the USB bus and able to move as much as 30MBps.

Out With A Bang

There you have it. From processors to platforms, graphics cards to storage devices, 2009 was unquestionably the power user's year. AMD and Intel agressivley went after value seekers. ATI flipped the script on Nvidia by preempting DX11 support before Win7 even launched. And this year's SSDs evolved significantly, delivering better performance and a more consistent experience than last year's offerings.

If you went hardware shopping in 2009, hopefully our list of favorites reflects some of the choices you made. If you're planning to go shopping with a bit of holiday loot, we think you'll find that our favorite components still hold up well moving into 2010. ▲

by Paul Cross

VIGOROUSLY POWERFUL

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Ever wish you could do what you love for a living? That's a pipe dream for most of us; we have enjoyable hobbies and tolerable jobs, and never the twain shall meet.

Not so for the crew at Vigor Gaming (www.vigorgaming.com; 866-907-3536), home of "The Gaming PC with Extreme Performance." A cadre of avid PC gamers put their heads together to design, build, sell, and stand behind the coolest gaming rigs they could devise. Against considerable odds, their dream became their day job. Thus was born a boutique PC vendor not quite like any other.

Such is Vigor Gaming's passion for the notebooks and desktops they build that the company invites the most discriminating critics—other hardcore gamers—to examine their systems right down to the smallest detail. Striving for a "balance of extreme performance and exquisite artistry," Vigor aims to create computers with the raw power to back up their exotic looks.

That isn't to say that Vigor's systems are priced out of reach, a complaint often leveled at boutique builders in general. Thanks in part to the surprising levels of power to be found in even mainstream components these days, the company can satisfy enthusiasts on budgets with gaming laptops starting at $1,079 (the Aegis) and desktops beginning at just $619 (the Stealth small form-factor rig).

Of course, gamers willing to invest a bit more will find multi-GPU and even multi-CPU configurations on the menu. Intel Core i5/i7 rigs vie with AMD Opteron/Phenom II systems, while Nvidia and AMD graphics card options will have you seeing double, triple, or even quadruple with Quad SLI and CrossFireX. The $6,999+ Colossus towers over the desktop line, while the Atlantis ($2,939 base price) is Vigor's most storied laptop.

Each custom-built PC is subject to the rigors of the VIGOR.OUS testing program. This three-day, three-night burn-in period is tailored to the individual components of each unique build. VIGOR.OUS makes it take a while longer for you to receive your new rig, Vigor says, but it pays dividends in stability and durability assurance. It also allows the company to back its products with a limited parts and labor warranty (three years for desktops, one year for laptops), along with a 30-day money-back guarantee.

Vigor even sells components of its own. Its Monsoon convection and thermoelectric (Peltier) coolers have earned plaudits from reviewers worldwide, as have its iSurf hard drive coolers. Vigor also fields partial collections of hand-picked devices such as the Valence liquid-cooled ION barebones SFF.

Just as importantly, Vigor has gained an outstanding reputation in the customer satisfaction department. With the kind of personal service that's become a rarity in the industry, the company stands behind its customers as well as the products it sells.

Whether you plan to bootstrap or buy your next gaming rig, find out how Vigor Gaming can help. ▲

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PINNACLE OF PERIPHERALS

OUR FAVORITE PICKS FOR INPUT & OUTPUT

Peripherals tend to be the ignored, red-headed stepchild of the PC family. In a speed-crazy world, peripherals can lack the sizzle and globe-shaking significance of core components. After all, nobody makes a Moore's Law for mice.

But in a way, peripherals can be even more important than those core pieces. See the satisfaction difference between when your motherboard won't overclock that last little bit vs. when your mouse won't accurately track where you expect.

Components may determine what your system can do, but peripherals can determine how you do it. So we're glad to take this chance to look back and make sure some of the best peripherals of 2009 receive their due credit. All were outstanding, and a few might just influence your product choices well into 2010 and beyond.

Mice & Keyboards

If it's nearly impossible to build a better mouse trap, building a better mouse (or keyboard) must be equally difficult. In 2009, there were no radical new designs, but we did see several incremental improvements that should help improve usability for people with specific needs.

Winner: Logitech Anywhere Mouse MX

$79.99; www.logitech.com

The real winner here is Logitech's Darkfield technology, which debuted in two mice last year: the mobile-oriented Anywhere Mouse MX and the oh-so-yummy Performance Mouse MX. Since Darkfield was created to let mice track on any surface, especially clear glass, and mobile users are far more likely than home users to encounter various work surfaces, it only made sense to pick the Anywhere Mouse MX, much as we might prefer its sibling.

Darkfield solves the old problem of using optical and laser mice on glass and other ultra-smooth surfaces. Traditionally, the mouse emits light, bounces it off of the underlying surface, then collects the reflected light in a sensor, essentially forming a snapshot. These snapshots are captured hundreds or thousands of times per second, analyzed, and the reference points within the image (grain, texture, etc.) form the basis of cursor movement as their position changes from frame to frame. The trouble is that there isn't enough detectable detail on very smooth surfaces, and glass confounds most mice because the light passes through the surface rather than reflecting back to the sensor.

Darkfield uses a trick from microscopy, where the strength of an illuminating light would often overpower a semi-clear object on the slide. But if you block the light from directly entering the lens, you can't see the illumination source and instead only see light bounced into the lens at an angle. The entire field of view looks dark save for light scattered from objects on the surface, such as dust and tiny scratches. With this approach and two lasers, Darkfield technology lets a mouse pick up sufficient tracking detail on practically any surface that isn't laboratory smooth.

The Anywhere Mouse MX is a typical low-profile, sculpted, largely ambidextrous design, weighing in at just 4.4 ounces with two AA batteries. It's equipped with forward and back thumb buttons, a frictionless scroll wheel, and a tiny USB transceiver not much bigger than a thumbnail. The mouse is just over 3.5 inches long, so it's easy to slip into a notebook bag pocket. That said, if you don't need portability, we love the Performance Mouse MX.

First Runner-Up: Razer Mamba

$129.99; www.razerzone.com

We were torn between Razer's Naga and Mamba. The Naga took a big step forward for MMO gamers, putting 17 buttons under the right hand to help better balance the gameplay load. But the hardware nuts around here had stronger feelings for the Mamba, which blends hot style with onboard memory for storing profiles with the option to operate in either wired or wireless modes.

"In designing the Razer Mamba, our R&D team had to resolve issues of latency, weight, and battery life," says Robert "Razerguy" Krakoff, president of Razer USA. "Before the Mamba, your typical wireless mouse had 2ms latency at best and weighed up to 169 grams, but the Razer Mamba has an industry-leading 1ms latency and weighs in at 129 grams [including the battery]. This lessens gamer fatigue and potential strain. With the Mamba's wireless option being just as effective as its wired counterparts, we think this marks the future of cord-optional gaming."

Second Runner-Up: Logitech G19

$199.99; www.logitech.com

While not for the ergonomically faint of heart, Logitech's G19 was a smash hit this past year. Customizable key backlighting? Nice. Integrated 2-port USB hub, 4-way pad with app switcher, and adjustable game/desktop mode? Nicer. Thirty-six programmable macros? Oh, yesss, my precious. But nothing beats that 320 x 240 tiltable (color!) LCD for VoIP and game data. It's the mother of all current gaming keyboards, and even though it costs two bills and requires an AC outlet for the integrated screen, we still love it.

Monitors

Size is impressive, but it's not everything. In 2009, the race to balloon diagonal measurements seemed to take a breather as vendors turned to more practical and stylistic concerns. And here's to hoping this "Dynamic Contrast Ratio" lunacy ends in 2010.

Monitor Winner: Asus MS246H

$239; usa.asus.com

Is it possible to have a truly stylish PC without buying a Mac or paying the Sony premium? Asus thinks so, and the company is currently reworking a lot of its peripheral lineup to get us there. The Designo MS series is Asus' attempt to bring killer fashion sense and high display quality to prices mainstream users can stomach.

The MS246H is a delicious 24-inch widescreen styled in a black bezel with white edges and back. A black ring attached to the back shifts slightly as you pull or push on the screen, letting you fine-tune the viewing angle. With its gentle curves and svelte, 0.65-inch thickness, the design is muted, attractive, and very much not cheesy.

The specs cover all of the 24-inch essentials: 16:9 aspect ratio, 1,920 x 1,080 (1080p) resolution, HDMI and VGA inputs, 250 cd/m2 brightness, and 2ms response time. A row of touch-sensitive LED controls adorns the bottom-right corner of the bezel, and the on-screen menus are simple enough for most. For the price, this unit's display quality is top-notch, delivering deep blacks and reliable color reproduction.

We like the MS246H as one of 2009's top displays because it represents everything a monitor should be heading into 2010: sexy, different, ready for any occasion, and affordable.

First Runner-Up: Viewsonic VX1932wm-LED

$199; www.viewsonic.com

First the oil spike, then the recession. Are we done panicking for 2010, or should we still be a bit cautious? In 2009, people wanted their products cheap, durable, and green. This is why we wanted a winning monitor to sport white LED backlighting for the dramatic drop in power consumption. There's Apple's 24-inch LED Cinema Display, but who has $899 when the odds are 1 in 10 that you're unemployed?

How about buying two Viewsonic 19-inch widescreen VX1932wm-LED displays? Commonly available for $149 a pop, you could buy three for half the price of one Cinema Display and still be sucking down only 45W across the group. Of course, we wouldn't recommend this model if it didn't have the specs to satisfy. The 10M:1 "MEGA" dynamic contrast ratio is merely an exercise in hitting the 0 key; the 1,000:1 typical is more meaningful. A 250 cd/m2 typical brightness and 5ms black-white-black response time will serve nicely. A 1,440 x 900 native resolution will not compel 1080p purists, we know, and the integrated speakers are pretty lame. But who uses integrated speakers? If you want 1080p along with HDMI input and more glass, Viewsonic's 24-inch widescreen VX2433wm is a screaming buy at $199.

Second Runner-Up: Samsung Lapfit LD220G

$249.99; www.samsung.com

The LD220G is a 21.5-inch, 16:9 widescreen LCD. The specs are fair: 1,920 x 1,080 resolution, 300cd/m^2 brightness, 1,000:1 typical contrast, 5ms response time, 170-degree horizontal viewing angle, D-Sub connector, and—USB? Why, yes. The Lapfit is meant to be a secondary display for your notebook. Whereas a typical second display is too large and cumbersome to be convenient, Lapfit's panel is only 2.3 inches deep, sports a handle on the back, and has a kickstand to keep it steady and upright on any desk.

With the USB connection, you simply plug into your notebook and voila—dual-display. The Image Size function makes sure that your 4:3 output doesn't stretch on the widescreen. Because the

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screen bezel sits right on the desk, the display height almost matches that of the notebook screen, making for a more seamless view between screens. The image quality on the LD220G is fair, but this isn't a screen you use for Photoshop or cinema entertainment. It's a mobile productivity booster, and an overdue one at that.

Networking Devices

At last, 2009 seemed to mark the end of the reign of 10/100 Ethernet. Gigabit is now the consumer standard at nearly *all* price levels, but this leaves the question of what to do when Gigabit connectivity isn't an option. On this front, innovation continues at breakneck speed.

Winner: Linksys WRT610N

$199.99; www.linksysbycisco.com

If we were just going to talk about performance, we'd have picked Ruckus' MediaFlex 7000 products. Its beamforming technology blows all other Wi-Fi off the map. The trouble is that Ruckus isn't interested in selling direct to the consumer market. Cisco, via Linksys, obviously is.

The WRT610N is Cisco's latest 802.11n home router, this time updated with a glossy black-and-blue trapezoidal shell and support for simultaneous dual-band. This is a must-have feature for heavy wireless users. The 2.4 and 5.0GHz radios can't be bonded for simultaneous connection to a single client, but you can, for example, take a superior 5.0GHz connection to a video playback device while running a separate 2.4GHz connection to a Skype phone or netbook. Cisco uses a "Double Channel Width" mode, media-sensitive QoS, plenty of security options, and four Gigabit Ethernet ports. There's also functionality for USB-based storage attachment and UPnP A/V serving.

Pretty standard issue, so far. You could find the same from Netgear, D-Link, and plenty of others. What tipped us to Linksys was the inclusion of Network Magic Basic 5.5. Network Magic is a wizard-driven network map and task manager. Yes, Cisco wants you to upgrade to the Pro version, but even the Basic edition will guide users through setup, show them problem spots, and help them back to a healthy network. It's like Norton Utilities for the LAN—mostly functions that were there to begin with but have been repackaged to make them convenient.

Now, we know that Linksys and Network Magic tend to aim at mainstream consumers, beginners in particular. We all have them in our families. So why make a big deal about the WRT610N? Because Cisco's mission is to make these products so foolproof that you'll never again have to burn hours and hours as free IT support for your friends and family. That idea alone deserves an award.

First Runner-Up: LG N2B1DD2

$549.95; www.lge.com

We love NAS boxes, and we love media servers. LG deserves credit for acknowledging that a lot of power users have amassed mountains of hi-def content and want to put it on the network. With two stealthed hot-swap bays and RAID 0, 1, and JBOD support and backed by a Gigabit Ethernet port, this NAS comes ready to burn media straight to the integrated Blu-ray burner—a great idea considering how long and CPU-intensive such projects tend to be.

With three USB ports and a 4-in-1 card reader, the box comes ready to take on a lot more storage. All the other essentials are here, too: remote access, FTP server, iTunes server, auto-syncing backup, network print serving, and more. We wish LG had a 4-bay version, but two will do for 2009.

Second Runner-Up: D-Link DXN-221 HD MediaBridge Coax Network Starter Kit (DXN-221)

$239.99; www.dlink.com

MoCA (Multimedia over Coax Alliance) may be the best but most underrated networking technology on today's market. With a theoretical throughput speed of 270Mbps, this may not sound like much compared to Gigabit Ethernet and 802.11n. However, few of us have GigE ports scattered around the house, and wireless performance can be slaughtered by a wide range of factors.

A funny thing happened this year. We figured out through testing that MoCA actually blows away Wi-Fi and powerline if you're trying to network across a decent-sized home. MoCA suffers almost no signal drop-off or latency as you span to 50 feet and beyond. In fact, we've seen MoCA sustain a *minimum* TCP transfer speed of greater than 70Mbps across a house—more than enough for two HD video streams. Try that with Wi-Fi.

If it sounds like we're rewarding MoCA more than D-Link here, well, we are, but D-Link's DXN-221 is a well-documented, simple, and affordably priced option. The kit includes two DXN-220 devices. One connects to your router, the other to the target client device. There's encryption if you want it and 14 channels of 50MHz each. If you've wanted a way to get Gigabit-level performance without the in-wall investment (or a mess of wires everywhere), this is your best bet provided you have the coax outlets where you need them.

Printers

Now that the inkjet Picoliter Wars have reached a virtual stalemate, vendors have stopped squabbling over image quality and have turned their attention to functionality. In 2009, we saw LAN and Internet connectivity hit consumer printers in full force, making the new race one of easy interfaces and expanding convenience (which, of course, makes you use ink faster).

Winner: HP Photosmart Premium With TouchSmart Web

$399.99; www.hp.com

HP borrows from its TouchSmart PC experience and here implements a 4.33-inch touchscreen UI on the front of its all-in-one inkjet printer/fax/scanner/copier. The device connects via Ethernet or 802.11b/g/n to your network for direct access to the Web. (It also features Bluetooth for direct printing from handheld devices.) Of course, it's not like you're running Firefox with the whole Web at your fingertips. Rather, HP implements a dozen or so apps for sites such as Coupons.com, Fandango, Nickelodeon, and USA Today. Through these apps, you can browse for printable coupons, buy movie tickets, print maps, output a daily news digest, and so on. It's a slick idea.

As an all-in-one, the Photosmart Premium with TouchSmart Web (model C309n) will be bulky on a countertop, but we're still intrigued by the idea of harnessing the Wi-Fi connectivity and making this into a centrally located device for the whole family. At half the size and with twice the screen (plus many, many more apps), this might be a really persuasive integrated design.

Web stuff aside, the C309n is still a decent multifunction printer. Printing in both color and black-and-white at up to 32ppm per HP's rating, the unit will scan documents up to 8.5 x 11 at 4,800 dpi. Output quality is very good, and we especially like that HP opted for single-ink cartridges rather than far more wasteful combo cartridges. All told, the C309n shows that the race for output quality among top-name consumer printers plateaued some time ago. The race going forward will be for better software and lower cost per page.

First Runner-Up: Canon Pixma MP990

$299.99; www.usa.canon.com

Once upon a time, Canon inkjets were the outcasts of the printer community: slow, underfeatured, and inferior in output quality. The Pixma MP990 proves that those days are over. True, the flip-up 3.8-inch LCD, with its nearby array of buttons and control wheel, takes a distant second to HP's touchscreen in usability, but the rest of this print/copy/scan MFD is outstanding. Forget Canon's assurance of up to 300 years durability when using its ChromaLife consumables. We're not even too jazzed that Canon's 9,600 x 2,400 dpi photo output is now on par with HP and Epson rivals. We're more impressed that Canon has got its 4x6 borderless photo print times down to about 20 seconds and that scanning times have plummeted from years past.

The MP990's biggest draw for us was its 4,800 x 9,600dpi film scanning. Just snap off the white padded plate on the underside of the MFP's lid, and you'll expose the film adapter strip. Now it's just a matter of using the included negative strip or slide carrier to hold your film in position on the glass. Scan times are relatively fast, and the output quality is outstanding—a huge improvement over prior film-ready MFDs we've tried.

With a flash card reader, Ethernet, Wi-Fi, six single-color cartridges, 150-sheet tray, rear feed capability, USB 2.0, and PictBridge support, the MP990 is a must-own if film preservation is on your MFD agenda.

Second Runner-Up: Epson PictureMate Charm

$149.99; www.epson.com

Name aside, the PictureMate Charm is a downright excellent mobile photo lab. True, there's not much that's new here. Epson has been cranking out PictureMate designs for five years. But no vendor has demonstrated superior print quality to Epson, and at a time when mobile functionality only continues to gain in popularity and importance, having a print-lab-in-a-bucket can be very handy.

The Charm can work with a PC, but it's really meant to stand alone. The flip-up 2.5-inch LCD, row of control buttons, and stealthed card reader make going from raw photos on flash media to finished 4x6 glossies relatively cake. Making Bluetooth included rather than optional would have been an improvement, but Epson beats its portable HP competition on print quality and consumable cost, averaging about 30 cents (and 60+ seconds) per borderless print.

Looking Forward

We're kicking off a new decade, and the changes coming up promise to be huge. As USB 3.0 delivers a tenfold performance gain, look for peripheral vendors to discover new ways to turn this bandwidth into better functionality. Will DisplayPort displace HDMI? Will flat screens finally sprout Gigabit Ethernet ports? We can't wait to find out. ▲

by William Van Winkle

PROGRAMMED TO PERFECTION

THIS YEAR'S BEST APPS

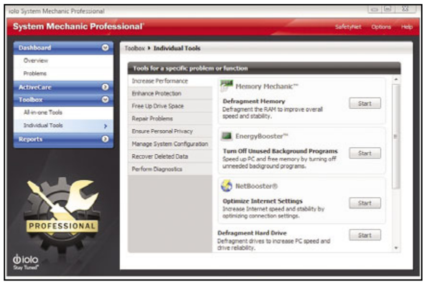
Though 2009 may be remembered as the year of the netbook, last year also saw the release (or wide acceptance of) some really great software. In fact, this year it was a little hard to limit ourselves to our annual "top three" within just four categories, but doing hard work is our job and we like it.

System/Drive Utilities

If there's a problem with your computer, hard drive, or files, then the quality of your other software doesn't really matter. So, it's a good thing that each of our favorite system/drive utilities for the year will help you keep your rig in tip-top shape.

Winner: Iolo System Mechanic 9 Professional

$69.95; www.iolo.com



Defragment the RAM to improve overall speed and stability.

Speed up PC and free memory by turning off unneeded background programs.

Increase Internet speed and stability by optimizing connection settings.

Defragment drives to increase PC speed and drive reliability.

There's no shortage of utilities for optimizing the Windows Registry, defragmenting hard drives, removing junk files, monitoring S.M.A.R.T hard drive parameters, shredding files, enabling and disabling startup files, etc. But there's only one suite where dozens of these tools all share a common interface, a common "Undo" function, and a front-end that organizes all the tools into a manageable structure and workflow. That suite is System Mechanic 9.

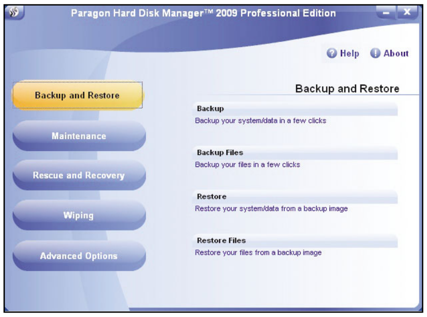
SM9 is available in two versions. SM9 Professional includes built-in antivirus, a two-way firewall (needed only for Windows XP), a deleted file recovery tool, and a secure hard drive eraser; standard System Mechanic skips these and saves you $20 if you already have utilities covering the above-mentioned tools. Either way, SM9 analyzes your system and presents you with a list of the troubles it's found, offering to fix them all in one pass or letting you review the problems one-at-a-time and take care of them yourself or let SM9 handle the clean-up.

Unique to SM9 is a system of downloadable updates, even for the standard version. These updates deliver the latest tweaking techniques and methods to accommodate new software and new strategies to improve performance. Although we didn't see any significant changes in the brief time we used the latest version, it's nice to know that System Mechanic 9's optimizations actually improve as Win7 is better understood.

First Runner-Up: Paragon Software Group Hard Disk Manager Professional 2009

$129.95; www.paragon-software.com

Everyone needs to manage files and folders on their hard drives, but only a select group of power users need to manipulate their hard drives on a high level. Dealing with partitions and Master Boot Records and needing to copy, back up, and restore entire hard drives, regardless of their file system, are standard procedure for a subset of enthusiasts. Though by no means cheap, Paragon's Hard Disk Manager Professional 2009 is the best tool for these and other jobs.



Backup your system/data in a few clicks

Backup your files in a few clicks

Restore your system/data from a backup image

Restore your files from a backup image

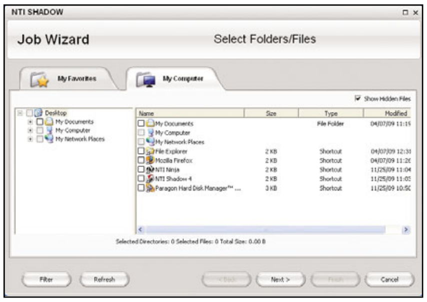
Most Linux boot disks come with GParted, a tool that can create and nondestructively resize partitions and format disks. It has a nice GUI, too, but that's basically it. HD Manager Pro goes much further, supporting file systems GParted doesn't, offering drive migration and backup/restore wizards that don't come with GParted. Full of detailed tools that techies love, HD Manager Pro is on a level that GParted can't touch.

It works within Windows, but it also comes with VistaPE and Linux-based boot CDs that can handle every computer we've ever tried it on.

Second Runner-Up: NTI Shadow 4

$39.99; www.ntius.com

One of the simplest ways to back up your work is to just make a copy of it as you move to another hard drive or thumb drive, but of course, it's never



Name	Size	Type	Modified
☐ My Documents		File Folder	04/07/09 11:1
☐ My Computer			
☐ My Network Places			
☐ File Explorer	2 KB	Shortcut	04/07/09 12:3
☐ Mozilla Firefox	2 KB	Shortcut	04/07/09 11:2
☐ NTI Ninja	2 KB	Shortcut	11/25/09 11:0
☐ NTI Shadow 4	2 KB	Shortcut	11/25/09 11:0
☐ Paragon Hard Disk Manager™ ...	3 KB	Shortcut	11/25/09 10:5

Selected Directories: 0 Selected Files: 0 Total Size: 0.00 B

really that simple . . . unless you're using NTI Shadow 4.

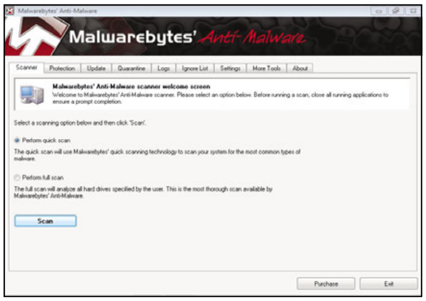
Tell Shadow what folders and files you want it to automatically copy, how many versions you want it to keep track of, and the destination storage device for the copies. Then forget about it. After a few seconds of creating or modifying a file stored within a watched folder, Shadow copies the entire file, without compression or encryption, while consuming almost no CPU resources. If your storage device is temporarily unplugged, Shadow will wait until it's connected again and then push through the files—no user interaction necessary. Backup couldn't be simpler.

Security Applications

We normally include our favorite security suite(s) in this category, but because we're evaluating them in another article in this very issue (see "Keep The Barbarians Out" on page 75), this year some smaller-scale gems have an opportunity to shine.

First Place: Malwarebytes Anti-Malware

Free; www.malwarebytes.org



Malwarebytes' Anti-Malware scanner welcome screen

Welcome to Malwarebytes' Anti-Malware scanner. Please select an option below. Before running a scan, close all running applications to ensure a prompt completion.

Select a scanning option below and then click 'Scan'.

● Perform quick scan

The quick scan will use Malwarebytes' quick scanning technology to scan your system for the most common types of malware.

○ Perform full scan

The full scan will analyze all hard drives specified by the user. This is the most thorough scan available by Malwarebytes' Anti-Malware.

Malware (aka spyware, Trojans, scamware, and lots of others) continues to be a big problem, despite user education and advances in real-time security scanning. In fact, when malware has taken hold of a system so thoroughly that many other security programs won't even start, Malwarebytes Anti-Malware can usually take care of the problem with just a few clicks, all for the amazing price of nothing.

Malwarebytes is essentially a foreground scanner, much like older utilities such as Ad-Aware: Just fire it up, let it automatically download updates, and click the Scan button. It defaults to a "quick scan" that just checks RAM and the common locations for malware, but a full scan checks every folder on your hard disk when you have the time. When it finds nasties, it presents them in a simple list with everything already selected, all ready to be deleted. It couldn't be simpler.

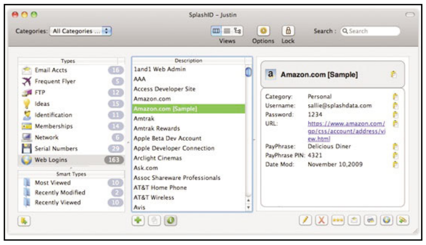
The proof, they say, is in the pudding, and Malwarebytes Anti-Malware is remarkably successful at cleaning out stubborn malware. For truly infested systems, the simple trick of renaming the executable and then manually downloading and installing updates usually does the job, or you can pull the infected drive and let MAM scan it from a clean system.

The paid version of MAM ($24.95) has real-time scanning and scheduling of foreground scans and update downloads, but we prefer lighter-weight tools for keeping clean systems clean. Instead, keep MAM handy for when the horse has already left the barn. And don't be surprised when it fixes your malware problems.

First Runner-Up: SplashData SplashID

$29.95; www.splashdata.com

There are plenty of encrypted password lockers out there, but the vast majority of them have a fatal flaw: They only work on your computer, and you therefore have to be by your computer to use it. We now have to deal with passwords, account numbers, and PINs when we're away from our computers and out in the real world. As such, we think the best password locker is one that works both on your computer and on a device that you always have with you, such as a smartphone.



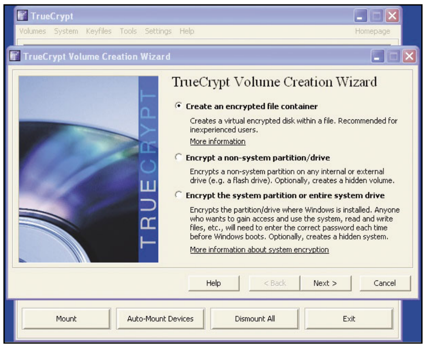
Amazon.com [Sample]

Category: Personal
Username: sallie@splashdata.com
Password: 1234
URL: https://www.amazon.com/gp/css/account/address/view.html
PayPhrase: Delicious Diner
PayPhrase PIN: 4321
Date Mod: November 10,2009

SplashID consists of two components. One lives on your Windows PC or Macintosh, using AES and Blowfish encryption to store your passwords safely under one master password. The other lives on your portable device, including Palm OS-based handhelds, Win-dows Mobile/Pocket PC devices, Black-Berrys, the iPhone/iPod touch, and Nokia Series 60-based phones, using similar encryption to secure your info even if you lose your device. Both halves sync with each other, ensuring updated info wherever you go.

Second Runner-Up: TrueCrypt

Free; www.truecrypt.org



TrueCrypt Volume Creation Wizard

● Create an encrypted file container

Creates a virtual encrypted disk within a file. Recommended for inexperienced users.

More information

○ Encrypt a non-system partition/drive

Encrypts a non-system partition on any internal or external drive (e.g. a flash drive). Optionally, creates a hidden volume.

○ Encrypt the system partition or entire system drive

Encrypts the partition/drive where Windows is installed. Anyone who wants to gain access and use the system, read and write files, etc., will need to enter the correct password each time before Windows boots. Optionally, creates a hidden system.

More information about system encryption

If you really want to keep something on your computer secret, then it needs encryption, but there can be two problems with this.

The first is the nature of how Windows works: It might store transient information such as logins and passwords into the swap file or other slightly less sensitive information into temporary files, even if you're doing your best to use an encrypted volume for data storage. The second is the nature of how humans work: If you're pressured or frightened into revealing your password,

Thermaltake
COOLall YOUR LIFE

Element V, a super full tower chassis, comes with full arsenal of cooling power that enables it to handle all of today's most high-end CPU and graphic cards available such as Intel Core i7 or latest ATI Radeon HD 5800 & 5700 Series graphic cards. Once the chassis is opened, one will immediately notice the full-array of oversized cooling fan that are strategically positioned to achieve maximum cooling efficiency. Ultra-silent 200mm LED exhaust fan on top and 230mm LED side panel intake fan work in perfect harmony to accelerate heat removal. Two 120mm intake (one with LED) fans, each located on the front of two 3-bay HDD cages to ensure valuable data stored are properly cooled. Thermaltake's proprietary Colorshift control enables real-time fan speed adjustment as well as various different lighting effects. Native 2.5" disk drive mounting also enables support for the advanced 2.5" Solid State Disk drives. With features so advanced, one may easily think that this chassis is from out of this world.

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myspace.com/ThermaltakeUSA, youtube.com/ThermaltakeReview, flickr.com/ThermaltakeInc

DELL RadioShack MICRO CENTER Fry's BEST BUY newegg COMPUSA amazon.com TigerDirect.com city

unless you're a Green Beret, you're likely to give it up to the person "asking."

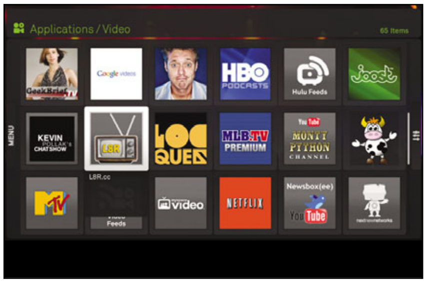
TrueCrypt employs AES-256 encryption to encrypt your entire bootable Windows drive, meaning there just aren't any temporary places your data might remain unencrypted in Windows. You can also create a second undetectable encrypted drive within an encrypted drive, creating plausible deniability if you're ever pressured to reveal the master password. It's win-win for you and your secrets.

Media File Apps

Although creating, editing, and viewing multimedia files from your local hard drive has been and still is important and useful, the big trend for 2009 is making the media you find on the Internet more easily accessible, especially if you have a PC hooked up to your living room television. Our best of the year in this category reflect this trend.

First Place: Boxee

Free; www.boxee.tv



Although not without wrinkles, at this point there's no finer one-stop shop for online multimedia than Boxee. (And it also does a fine job with your local files.) Boxee's interface is designed for easy interaction via a remote control or wireless mouse, complete with large graphical elements suitable for display on a large television across the room, but it works so smoothly with a regular mouse and keyboard that you'll probably prefer Boxee to your Web browser for your desktop computer or laptop.

Other than the slick interface, Boxee's main claim to fame is its well-organized direct links to videos on existing Web sites such as Hulu, Comedy Central, CBS, YouTube, and hundreds of other sources. It organizes content into season/episode lists and plays content (in HD, when available) in fullscreen mode automatically. New "applications" (essentially links to different Web sites) appear all the time, and there's even a Netflix streaming application for online rentals.

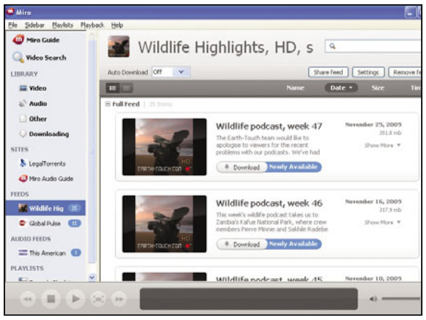
Boxee also knows about your local files, offering browsing and "bookmarking" options to make it easy to play your videos (regardless of encoding), music, and images from one place.

Finally, if you tell Boxee who your fellow Boxee-using friends are, you can share links, reviews, and comments with each other, sort of like a video-watching social network. Thankfully, if you want to keep your viewing habits private, this last bit is entirely optional.

Don't let Boxee's beta status scare you; it's already highly polished software. Boxee is available for Windows, Mac, and Linux computers, and it's free, so there's no excuse for not checking it out.

First Runner-Up: Miro 2.5

Free; www.getmiro.com

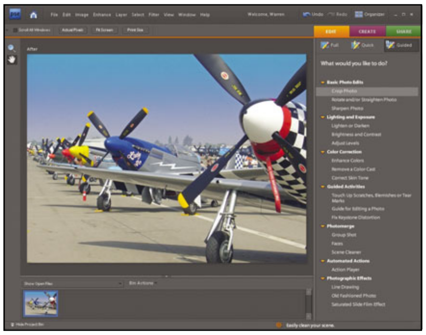


While Boxee is all about giving you a seamless way to view online content, Miro is all about automatically downloading online content to your computer for later viewing at your leisure, sort of like an Internet-aware DVR. Once set up to be on the lookout for new episodes of your favorite programs (and Miro comes with links to hundreds of channels and programs), Miro downloads them automatically and arranges them attractively. The built-in viewer makes playback a cinch, too, and its 10-foot interface works great on a big-screen TV in your living room with a remote-control mouse.

Miro can do all this because it has a built-in RSS reader/interpreter as well as a built-in downloader/BitTorrent client. If your favorite video podcast or video blog publishes its releases via an RSS feed, just tell Miro about it, and Miro will grab new "episodes" as soon as they're released. Miro will also delete old files to save space. If there were a way to automatically push videos to portable devices, Miro would be simply perfect.

Second Runner-Up: Adobe Photoshop Elements 8 & Premiere Elements 8

$149.99; www.adobe.com



There's no denying that Photoshop and Premiere are the most powerful tools for editing and enhancing photos and videos, but they are complicated, expensive tools that require some skill to use properly. For those of us who don't have the money or time (or both) to get the most out of the full-fledged versions of these programs, Adobe has distilled their inherent goodness down to more consumer-friendly versions. Photoshop/Premiere Elements are filled with wizards and presets that generally do an astonishingly better job performing tasks and cleaning up images and videos than nearly every free tool we've tried.

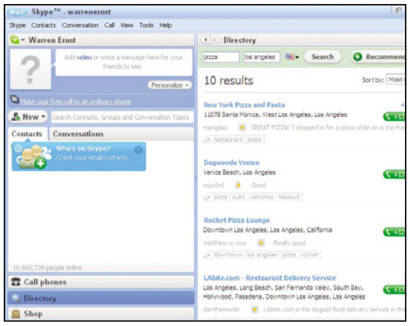
Both Photoshop Elements and Premiere Elements are available separately, but Adobe's bundle lowers the price of each to just $75. Some neat tricks include combining multiple group photos into a single photo where no one is blinking and automatic motion tracking of added graphics in videos, among others. Additionally, both products have tools for managing huge libraries of large files across multiple computers and devices.

Miscellaneous Apps

As always, there are some products that don't fit into our pigeonholes, but our top three picks in the Miscellaneous category are all similar in that they make use of the Internet in one way or another, and two of them can save you serious money vs. their "conventional" competition.

First Place: Skype

Free; www.skype.com



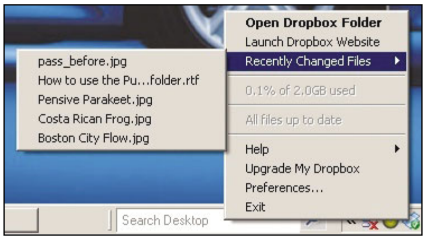
If you want to make telephone calls with someone who lives a great distance away (even in another country) but has a computer and a broadband connection, then you and that someone need to get Skype right now. Any two computers running Skype anywhere in the world can use their speakers, microphone, and Web cam to make phone and video calls to each other for free. And so long as both users are using their computers (or certain smartphones) to initiate and answer the call, they can talk for as long as they like for free. Still not satisfied? The software that makes the magic happen is free, too, and is available for Windows PCs, Macs, Linux boxes, along with the iPhone, Windows Mobile devices, certain high-end Nokias, and even Sony's PSP.

On top of this, you can pay Skype a little money for the ability to make calls from your Skype device to normal telephones. Similarly, you can route from a special telephone number obtainable in 26 countries to your Skype software. If you want to ditch the computers, you can buy Wi-Fi-enabled "Skype phones" that look and feel like a normal cordless phone, but they accept incoming Skype calls and dial out to the Skype network.

Skype made major inroads in 2009 to increase the sound quality and has largely succeeded, although it pays to get a quality microphone or headset to take full advantage. Longtime users may have been a little put off by the new interface released this year, but we've learned not to mind when talking to someone in Japan for free.

First Runner-Up: Dropbox

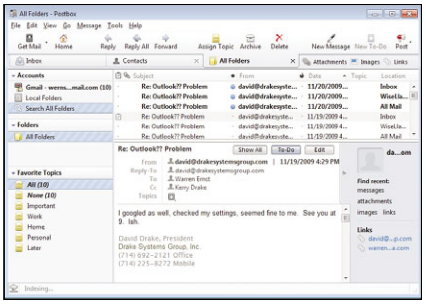
Free; www.dropbox.com



The only thing more frustrating than using your other computer and not having the file you need to work on is realizing that a hardware problem or virus has actually ruined the file and you don't have a backup.

Dropbox kills two birds with one stone: Not only does it automatically synchronize all the files you store in the "My Dropbox" folder (and all the computers you've installed Dropbox on) with the Dropbox Web site but it also keeps a few versions of all your files stored online, acting as an online backup. The Web site interface lets you access all your files, but when you need to recover all of them after a system-crippling disaster, the easiest thing to do is to install Dropbox and let it retrieve your files in bulk.

Versions exist for Windows, Macs, and Linux. Downloading Dropbox gets you 2GB of free storage, or, if you really like the online storage options Dropbox gives you, you can pay $9.99/$19.99 per month for 50/100GB.



Second Runner-up: Postbox

$39.95; postbox-inc.com

Although it seems the world is moving toward hosted email solutions, the email client program is among the most important applications on our hard drives. And because years of messages may be tied into a particular program, people are pretty attached to their email client—even if they've outgrown it and can't stand it. An email program has to be outrageously good to be worth the hassle of switching, but trust us, Postbox really is that good.

Based on the solid Thunderbird foundation, Postbox adds Mac-style slickness with Picasa-style searching and clever tools to your email. Postbox automatically indexes all elements of your email, from text to geographical addresses and maps, and is able to display links to related materials and messages as you read your mail. It's practically impossible to lose an old message.

The Final Download

Obviously, there's more great software waiting for you outside these pages, but we think these picks will help your system work harder, faster, and smarter. Again, we invite you to check out our roundup of 2010's security suites, many of which could've easily qualified for our Security category this year. "Keep The Barbarians Out" on page 75 has the full scoop.

And although it seems like there isn't a lot of change from year to year in the world of software, the next innovative apps is always right around the corner. Be sure to tune in next year to learn what new software can displace this year's best of the best. ▲

by Warren Ernst

COMING IN 2010

YOUR TICKET TO THE TECH HORIZON

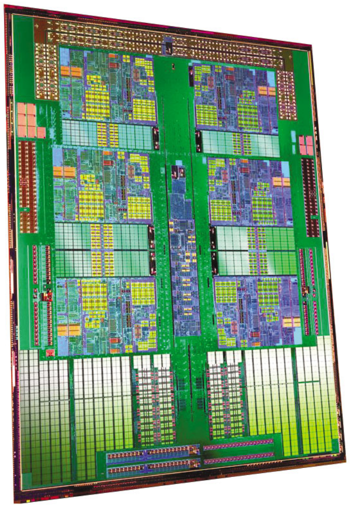
Nothing fires up the imagination quite like the unlimited possibilities of the future. Of course, the closer you get to the present, the less unlimited things look. Are we going to have light-based, 60-core CPUs and photo-realistic graphics in a netbook next year? Uh, no, probably not. However, we did make the rounds and spoke with reps from the industry's top companies, seeing what info we could shake loose about innovations set to arrive in 2010. As you might expect, most lips are sealed tight, so occasionally we had to get a little rough.

Processors

Intel's theme for 2010 is more cores and more integration. The company's "tick-tock" design method marches on, with this year ushering in the 32nm shrink for 2009's Nehalem architecture (codenamed Westmere). Interestingly, Intel will bring the new design first to the mainstream, using that smaller process to make room for a 45nm GMA graphics core inside the Clarkdale (desktop) and Arrandale (mobile) CPUs. Critics will no doubt take fire at Intel for having separate CPU and graphics/memory controller dies in the same CPU package, calling this a half-implemented attempt at integration. Critics said much the same when the Core 2 Extreme/Quad arrived, but we don't hear them squawking much anymore.

Clarkdale will feature a 32nm processor die with Hyper-Theading (launching with two physical cores and four threads), Turbo Boost, and a dual-channel DDR3 controller embedded in the 45nm graphics controller. Within the Core i5 family, Clarkdale will arrive with 4MB of L3 cache and speeds of 3.20GHz, 3.33GHz, and 3.46GHz. Core i3 variants will land at 2.93GHz and 3.06GHz. The graphics engine will be called the Graphics Media Accelerator HD, and even though it's not on-die with the CPU, prerelease info we've seen from Intel shows promising advances over current G45 graphics in both performance and image quality.

The big Westmere guns will land midyear courtesy of Gulftown, the 32nm Extreme Edition with six cores capable of 12 threads. Gulftown will be socket-compatible with existing X58 boards. As Intel's Dan Snyder puts it, the smaller process "gives you a little more real estate in the same thermal profile. It's like an extra two cores for free."



AMD's upcoming CPU, code-named Thuban, brings six cores of fury to the table. It will battle Intel's hexa-core Gulftown chip for your desktop PC's affection.

Meanwhile, AMD continues to try to shift the spotlight away from processors to a "balanced platform" spanning CPU and graphics. The "Dragon" enthusiast platform of 2009 will transition to Leo in 2010, emphasizing DirectX 11 and up to hexa-core processors. (Scor-pius in 2011 will move to 32nm, octo-core architecture.) On the mobile side, 2010 will deliver Danube, also with DirectX 11. AMD mobile chips will cover triple- and quad-core models and allegedly yield seven hours of "resting" battery life. The much-anticipated hybrid CPU/GPU Fusion processor, originally rumored for a 2009 release, has been pushed back to 2011.

AMD's hexa-core desktop chip is codenamed Thuban, taken from the name of the ancient north pole star in the constellation Draco. Thuban will remain on the 45nm fab process and is expected to have 3MB of L2 cache (512KB dedicated per core) and 6MB of shared L3 cache. AMD will integrate a dual-channel DDR3-1333 memory controller. Best of all, the chip will be compatible with today's AM3 sockets.

Motherboards

No matter whom we asked about innovations for 2010, the first reply out of every board manufacturer's mouth was "SATA 6Gbps and USB 3.0." The first feature is fairly self-explanatory. USB 3.0, which actually reached final spec in November of 2008, will leap from the 480Mbps of USB 2.0 to a new SuperSpeed mode of 4.8Gbps. Naturally, expect real speeds to be less and be aware that you won't be able to use legacy cables for SuperSpeed bandwidth.

GIGABYTE™

Supports intel CORE i7 inside

Supports intel CORE i5 inside

intel Chipset inside INTEL® P55 Intelligent performance

USB 3.0 10X Super Speed

USB Power 3X

SATA 3.0 4X Speed via RAID 0

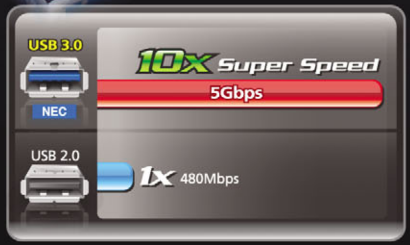
Fast Easy Powerful

GIGABYTE **P55** Motherboards *Accelerated* Edition

MARVELL SMART™ SATA 6Gb/s

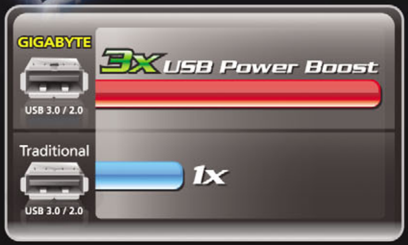
Simply Fast

USB 3.0 10X Super Speed



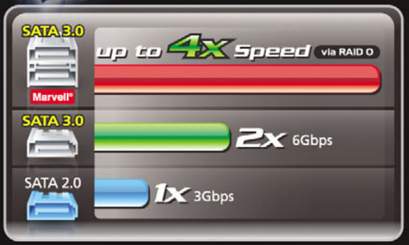
World's first USB 3.0 logo certified solution from NEC

USB Power 3X



Utmost compatibility with 3x USB power boost

SATA 3.0 4X Speed via RAID 0



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P55A-UD6

P55A-UD4P

P55A-UD3P

P55A-UD3

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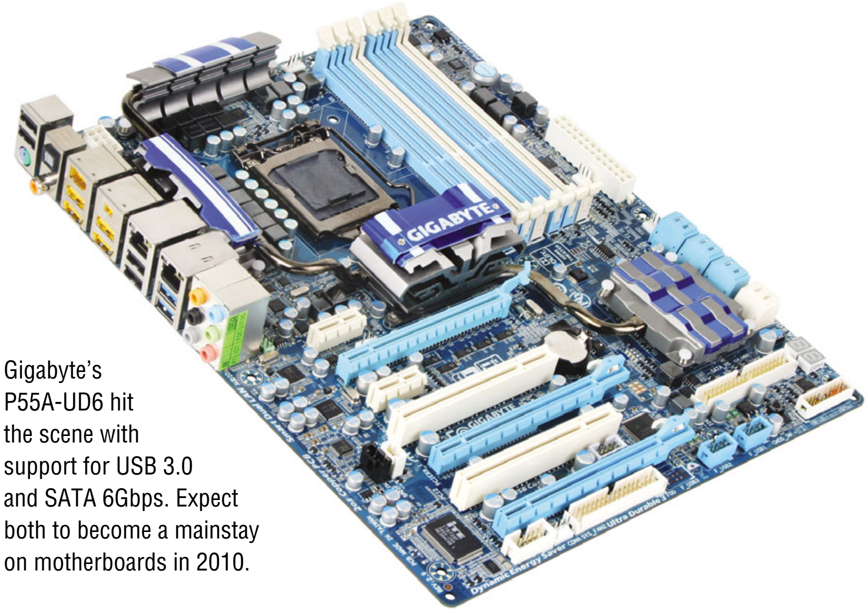


Gigabyte's P55A-UD6 hit the scene with support for USB 3.0 and SATA 6Gbps. Expect both to become a mainstay on motherboards in 2010.

The first motherboard with USB 3.0 support was the P6X58 Premium from Asus, which appeared on the Web last July. However, Asus pulled the board back for release alongside Intel's Gulftown launch and perhaps to let device manufacturers catch up with supporting USB 3.0 and SATA 6Gbps products. The P6X58 will cater to overclockers with multiphase power management, antisurge protection, and next-gen PCB cooling. Also look for Asus (and everybody else) to release another board line with Intel's H55 and H57 chipsets for Clarkdale, probably at CES in January. These should also support USB 3.0 and SATA 6Gbps. Additionally, Asus is prepping a new technology for this generation called GPU NOS.

"GPU NOS is the world's first automatic GPU [overclocking] tool," says Asus Technical Marketing Specialist Juan Jose Guerrero. "It can intelligently detect real-time GPU rendering/loading via a sensor circuit. From the information measured, we then can automatically adjust GPU performance through overclocking and automatically boost GPU performance."

Gigabyte is another vendor getting ready to hop on the new high-speed interfaces. Although we're not sure if we really want our faces beamed to the world in 1080p Web cam glory, expect USB 3.0/SATA 6Gbps boards enabling this to appear on P55 platforms, as well, such as Gigabyte's imminent P55A-UD6 for LGA 1156. "We are the only manufacturer with these features implemented on all product lines in our AMD and Intel platforms," says Gigabyte spokesperson Angela Lan.

Once the H55 and H57 arrive, look for board vendors to put more of a push on home-theater options, as the chipsets will support Blu-ray quality audio output, including over HDMI.

Storage

These days, we have to acknowledge that there are two sides to any storage discussion: flash and magnetic. The days of SSDs being solely for early adopters and the fabulously wealthy are over. In fact, that's probably the biggest storage story of all for 2010. We already have SSDs retailing for under $150, such as the 64GB entry-level SSDNow V-Series from Kingston; a handful of 32GB drives are available online for less than $100 (if you think you can live with that capacity). Given the great performance advantage even a low-end SSD gives to tasks such as Windows startup and hibernation, we expect 2010 to bring a change to mainstream PC configurations. Suddenly, having a relatively inexpensive, if somewhat low-capacity, SSD for the OS and core applications accompanied by a much larger, perhaps slower hard drive for all other data makes a lot of sense.

Hard drive vendors are mum on target capacities for 2010. However, Western Digital spokesperson Heather Skinner noted that "areal density has been progressing at about 40% compound annual growth rate for several years. That equates to doubling the capacity about every two years." In reality, WD went from 1TB to 2TB drives in a little under a year. Even figuring an 18-month doubling, that would put us at 4TB 3.5-inch drives just before the end of 2010, so hitting 3TB or greater this year looks like a safe bet.

Seagate launched its SATA 6Gbps Barracuda XT 2TB well before the end of 2009, and now the rest of the industry has to catch up. Given that the drive interface is backward-compatible with the 3Gbps standard and motherboard vendors will soon be driving SATA 6Gbps adoption, there seems little reason for drive vendors not to rush 6Gbps into their high-end lines (at least) as quickly as possible.

On the SSD side, expect manufacturers to match strides with Intel's, which moved to 34nm NAND production. "At this point, 34nm is ramping up relatively quickly and should be dominant [by] mid-Q1," says OCZ Vice President of Marketing Alex Mei. "So in Q1, there will also be an increase in higher capacity 2.5-inch drives beyond . . . 250GB. We fully expect 500GB 2.5-inch drives will be a trend consumers can expect industry-wide."

SSD firmware updates will continue to be critical. Late 2009 saw the widespread need for vendors to support the TRIM command. It seems likely that all 34nm drives will support this, but updated support in existing models will be more spotty. Also look for MLC to move into three bits per cell rather than the current two, which should yield another major jump in capacity.

System Memory

Corsair Senior Technical Marketing Specialist Robert Pearce was one of the few willing to admit to us that relatively little major news will hit the memory space in 2010. "We'll have a couple new speed grades, though," he says. "We're shooting for 2.5GHz XMP qualified on one kit. The other has lower frequency but tighter timings."

However, knowing that top-bin premium kits will carry a premium price, Pearce is admirably honest about what will benefit the majority of 2010 memory buyers. "To be perfectly honest, the end user would see more benefit from moving to a 64-bit OS and adding more memory rather than trying to run less memory at faster speeds."

DDR3 should become more affordable in general in 2010 as volume continues to ramp up. In November, iSuppli predicted that "DDR3 shipments will rise to account for more than half of the global DRAM market by the second quarter of 2010, surpassing DDR2 for the first time as the leading technology for PC main memory."

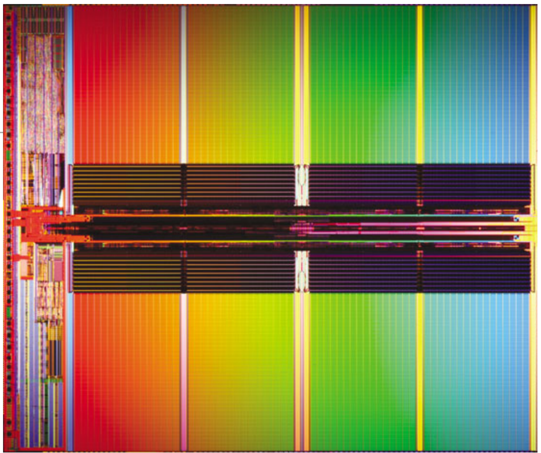
The other semi-news for 2010 dropped during Intel's latest IDF show, when Kingston appeared on a Clarkdale platform with 1.35V DDR3 rather than the usual 1.5V. This seems a likely direction for the market to go given Clarkdale's inevitable marketing emphasis on low power consumption. (70W is the oft-cited number.) Another shift that may materialize throughout 2010 is gradual migration from today's 50nm DRAM production to 40nm. Samsung validated the first-ever 40nm DRAM chips in February 2009, and memory fabs have been slowly adopting the new node. It seems very likely that the 40nm, 2Gb DDR3 chips now reaching fruition at Elpida, Hynix, and other manufacturers will be behind tomorrow's 1.35V modules.

Graphics

Perhaps the biggest question mark of all sits on graphics for 2010. By and large, AMD has already played its hand with the fall 2009 launches within the Radeon HD 5000 family. DX11 and DirectCompute support are launched—end of story for now.

So much advance information and conjecture has swarmed around Intel's forthcoming discrete GPU, code-named Larrabee, that it hardly seems like news. Nevertheless, the chip titan's latest foray into graphics will land in 2010. Intel CTO Justin Rattner demonstrated an overclocked Larrabee processor exceeding one Teraflop at Supercomputing 2009 in November. For comparison, the GeForce GTX 285 specs at 993 GigaFLOPs.

Like its GPU rivals, Intel implements a ring bus memory architecture (512 bits each direction), but instead of typical GPU stream processors, Intel uses x86 cores based on the old superscalar Pentium P54C architecture. This is a significantly slower design—closer to the Atom than the modern Core series—but one that scales well as tiny cores are piled in to run in parallel on one chip. The GPU will be fully programmable and should be very easy for developers to adopt, given its x86 base, but much about Larrabee remains unanswered—everything from core counts and clock speeds to power consumption and realistic benchmark results.



MLC drives should receive a nice boost in capacity, jumping from two bits per cell to three.

Finally, Nvidia has a double whammy waiting for 2010. First up is Fermi, the company's latest GPU architecture. Whereas today's GT200 has 1.4 billion transistors and 240 cores, Fermi will leap to 3 billion and 512 accompanied by 384-bit GDDR5 memory. Nvidia is calling it "the first GPU designed from the ground up for compute." Some have speculated that Fermi will become first and foremost the new heart of Nvidia's HPC-oriented Tesla line, that this is where the "big money" is going to be. If so, it might signal Nvidia wanting to double-down in a field it dominates while anticipating the asteroid collision of Larrabee in the consumer sector. This is where 3D arrives to counter this line of thought.

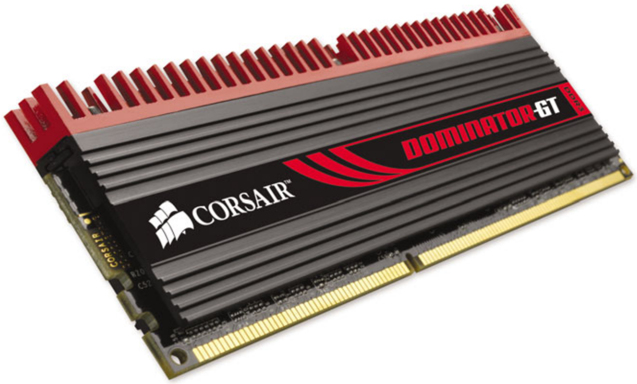
Have you wondered what's going to happen to all those new 3D movies when they come to home video? Nvidia's answer is 3D Vision—in desktops, notebooks, projectors, and more. You'll need a minimum GeForce 8800 GT and a 120Hz display, but the payoff is that 3D Vision will operate within individual desktop windows and as a browser plug-in. Google Earth in 3D? Done. Photo- and video-sharing sites with 3D? Count on it. The Asus G51J-3D will be the first notebook with 3D support via the GTX 260M chip and bundled 3D Vision kit.

Will 3D be the killer app for video and graphics in 2010? We'll soon see.

The Future Is Now

As 2009 winds down, expect 2010 to wind up in a big way almost the moment the gates open. With major architectures debuting and current technologies receiving incremental improvements, you should have *plenty* to hold you over until we're ready to gaze into our crystal ball again for 2011. ▲

by William Van Winkle

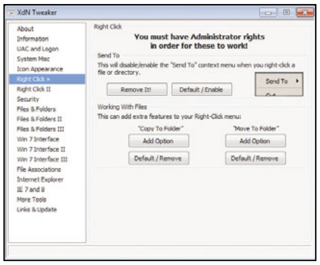


Next year, Corsair will push for screaming-fast 2,500MHz DDR3 in what appears to be a year of gradual improvements.

The Bleeding Edge Of Software

Inside The World Of Betas

XdN Tweaker 0.9.2.1



You must have Administrator rights in order for these to work!

This will disable/enable the "Send To" context menu when you right-click a file or directory.

This can add extra features to your Right-Click menu:

XdN Tweaker 0.9.2.1
Publisher and URL: Nicholas Caito, xenomorph.net
ETA: Q2 2010
Why You Should Care: You can start tweaking Windows 7 now. And you can do it without spending a dime.

Programs that "tweak" your Windows installation have a long and glorious history, and it's easy to see why. Most Windows tweaks—minor changes to enhance functionality or eliminate annoyances—are simple affairs frequently involving changing a few settings in the Registry or occasionally renaming a file or two. The trouble is, a lot of users are intimidated by the Registry Editor and don't care to dive deep into layer after layer just to change the shape of the arrow on a shortcut icon. Yet this is a simple task for programmers, hence that long and glorious history of tweak programs.

XdN Tweaker separates itself from other tweakers in several ways. First, it's free. Second, it isn't terribly complicated, filled with menus and submenus that make it easy to get lost or forget where to find a specific setting. Part of this simplicity is that XdN Tweaker is smart enough to realize what version of Windows you're running and then only display relevant options. In other words, you won't see the menu choices of "Win 7 Interface I" (or II and III) when using XdN Tweaker in WinXP or Vista. Smart.

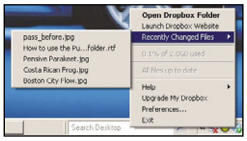
Because Windows 7 is the new kid on the block, we took special interest in the Win7 tweaks XdN offers. They include: enabling and disabling Hibernation; disabling auto-reboots after certain Windows Updates (you'll still need to reboot on your own); adding and removing the pop-up menus Send To, Copy, and Move commands; adding the Take Ownership command to the pop-up menu; making the Folder Views command work more like WinXP than Vista; enabling or disabling the auto-resize and auto-move cursor gestures; and enabling themes and Desktop images originally specified for other geographical regions. Of course, there are other tweaks too numerous to mention that work across nearly every version of Windows.

In the end, tweak programs let you adjust Windows to exactly the way you like it, and XdN Tweak is among the better free options and one of the few that already works with Win7. ▲

by Warren Ernst

Dropbox 0.6.570

Dropbox 0.6.570
Publisher and URL: Dropbox, www.dropbox.com
ETA: Q3 2010
Why You Should Care: Smart, hassle-free storage in the cloud. File sharing's a snap, too.



Thanks to widespread broadband connectivity, the idea of using some Internet site as a (paradoxically named) "remote attached-storage device" is completely practical. There's no shortage of online backup services, but for cross-platform, near-real-time storage services, it's hard not to consider Dropbox. Available for Windows, Mac OS, and Linux machines, Dropbox offers 2GB of online storage free during the beta period, though like many of Google's (unrelated) products, Dropbox's beta period seems never-ending.

Using Dropbox couldn't be simpler. Once downloaded and installed, Dropbox prompts you to either enter your account info or create an account on the spot. Next it creates a folder in your My Documents folder named My Drop-box. Copy files into the My Dropbox folder, and whenever you have an Inter-net connection, it automatically synchronizes with your online account "in the cloud," which these days is Amazon's S3 servers. You can go to the Dropbox Web site to directly upload or download files to your account, too, making Dropbox a simple online backup tool.

The amazing part comes when you install Dropbox on your other computers. They also get a My Dropbox folder, and it automatically synchronizes with the first computer. In fact, any files copied into the second computer's My Dropbox folder wind up appearing in the first computer's My Dropbox folder rather quickly—under a minute in many cases. Ramp up the process to include as many computers as you like, and the power of Dropbox becomes clear. Dropbox is also able to parse large files and only update the changed areas, so even large data sets are updated quickly.

There's a "Public" folder in the My Dropbox folder that allows items within it to be available to anyone on the Internet. Just copy in a file, right-click it, and choose Copy Public Link, and then email the resulting URL to whomever you want to see the file, and it appears within their Web browser as if it were hosted on a normal Web server. ▲

by Warren Ernst

SUPPORTS DirectX 11
ATI RADEON™ PREMIUM GRAPHICS
ATI CROSSFIRE X™ TECHNOLOGY
ATI STREAM™ TECHNOLOGY
ATI EYEFINITY™ MULTI-DISPLAY TECHNOLOGY
Windows® 7 Ready™

STEP INTO OUR REALITY

With XFX Graphics, know that you're getting something from a company who has always been for gamers, by gamers. Now adding the 5800 series ATI radeon cards to the line up, enjoy the emersion into a digital reality that you have been looking for. With ATI Eyefinity Technology, see things like never before with up to three displays at resolutions of up to 1080p, offering the first-ever "wrap-around" in-picture experience. Giving gamers what they want, XFX provides exclusive benefits in joining the family.

XFX PRODUCT BENEFITS

- **5 Star Support:** Register your product and gain immediate access to our industry-leading 5-Star Support program. Offering downloads of the best performing drivers for your product, product-specific help guides, message boards, and a host of other support features, everything and anything you could need is at your fingertips.
- **Factory Overclocking:** If XFX makes your heart race, wait until you try out our factory overclocked cards. XFX redefines “ultimate performance” in ways you never thought possible. Faster than any card in the XFX lineup—or any card on the planet for that matter—these limited edition graphics cards are XFX’s family jewels. By purchasing an XFX XXX Edition or Black Edition graphics card, you will be entering a world of the elite with perks and benefits.
- **Double Lifetime Warranty*:** Is a true industry first Protecting you—and a potential second owner—for the lifetime of the card, it’s a valuable perk for XFX Radeon Series Graphics Cards owners.

* This program is valid only on purchases made in North America (U.S.A. or Canada).

www.XFXforce.com

UP TO SPEED

Upgrades That'll Keep You Humming Along

A number of old favorites are refreshed this month, including Quicken, Adobe Lightroom, SyncToy, and Exchange Server. Creative types will no doubt be pleased with updates to Paint.NET and n-Track Studio.

Software Updates

Adobe Photoshop Lightroom 3 beta

Adobe is offering a sneak peek of the next version of its photo library manager, which introduces features such as improved image noise reduction, watermarking, film grain simulation, and a smoother importing process. Lightroom 3 should also include more online publishing options and more print layouts.

labs.adobe.com/technologies/lightroom3

Apple TV 3.01

Version 3.01 is an incremental upgrade that fixes an issue with the recent 3.0 upgrade that caused some content to disappear temporarily from the directory. The major update, version 3.0, substantially changes the top-level menu interface and gives Apple TV owners access to iTunes Extras now available with some digital film purchases.

support.apple.com

BitComet 1.16

Many GUI enhancements have been added to the P2P file-sharing client, including a new Task Tags page in Options, a better Directories page, and a Preview/Open button in the BT task file list. This BitComet update also adds support for super seeding and a better algorithm for Long-Time seed.

www.bitcomet.com

CCCalc 1.9

The free calculator gets a virtual keyboard for mouse-based input. A calculator history feature is here, as are ease-of-use improvements for streamlined input.

cccalc.excelsior-usa.com

FileZilla 3.3.0

The free FTP client fixes a problem that rendered a new connection unusable when users started it in the same tab as a cancelled connection.

filezilla-project.org

Fraps 3.0.1

This games benchmark and screen- and video-capture tool received a major upgrade, adding Windows 7 and DirectX 11 compatibility with version 3.0. This update also added support for recording gameplay in Nvidia's 3D Vision and lossless RGB compression for higher quality video recording. Version 3.0.1 includes a Minimize To Systray option for Win7 systems and corrects a bug that set the video capture rate at 30fps when users started Fraps.

www.fraps.com

Mac OS X 10.6.2

The update to Snow Leopard fixes a problem that can log you out involuntarily. There is a fix for Spotlight search results overlooking Exchange contacts. Safari plug-ins should be more dependable with this update. Apple has also resolved a problem related to opening downloaded files.

support.apple.com

Microsoft Exchange Server 2010

According to Microsoft, the enterprise-level email system now presents a more unified interface for Exchange across Desktop-, browser-, and phone-based clients. Users can now track conversations across the inbox and sent and deleted items folders. Defeat the CC contagion by "muting" irrelevant message exchanges.

www.microsoft.com/exchange

Microsoft Malicious Software Removal Tool 3.1

The latest version of Microsoft's software for detecting and removing select malware threats has been updated to find some of the latest invaders. Among others, it covers recent permutations of some of the most common blights, such as Blaster, Sasser, and Mydoom.

www.microsoft.com

n-Track Studio 6.0.7

This multitrack recording studio receives a refresh to its recent major upgrade. The Effects Browser now lets you drag and drop effects into tracks. Version 6.0.7 adds new features for Win7 systems.

www.ntrack.com

Paint.NET 3.5

The free, open-source paint program has a user interface now updated (including "new icons and visual styling" according to the software's Web page) for the Aero interface in Win7 and Vista. In addition to general performance improvements, such as 20% faster startup times, Paint.NET 3.5's memory use has been improved.

www.getpaint.net

SyncToy 2.1

The free Microsoft utility that synchronizes folders and files should copy files faster under all circumstances. The program is also more resistant to network and file transfer errors. There are also numerous bug fixes involving previous issues with NAS drives, SharePoint compatibility, and synchronization of deletions when "Echo" is enabled.

www.microsoft.com

Driver Bay

Zen X-Fi2 Firmware 1.02.03

For the new media player from Creative, the new firmware improves the X-Fi2's touchscreen's responsiveness. With the update, your device should also suffer from few instability issues when using a memory card.

support.creative.com

by Steve Smith

Keep The Barbarians Out

The 2010 Security Suites

We know what you're thinking. "Didn't you guys just cover computer security suites?" Indeed we have, in the July '09 issue, where we gave top marks to Norton Internet Security 2009 and Eset Smart Security 4 for bringing the best combination of ease of use, snappy performance, good detection rates, and, above all, smart automatic decision making to the game.

Since then, we've had developments. First, Windows 7 is out, is being widely accepted, is quickly pushing Vista out of the marketplace, and is even starting to displace XP on hot gaming systems, so for the first time, we're checking out Win7's performance when running security suites on "average" modern hardware. (For the nosy, that'd be a 3GHz Core2 Duo with 4GB of RAM, a pair of 1TB SATA hard drives, an Nvidia GeForce 8800 GT, and Win7 Ultimate.) Second, nearly all vendors have released "2010" versions of their apps with new features and Win7 compatibility; though frustratingly, Eset hasn't, so Smart Security is out this time.

How We Tested; How We Judged

Relying on previous discussions on online gaming forums, we spent serious time determining how security suites slowed down a system, interrupted fullscreen gaming sessions with background tasks and pop-ups, and interfered with both well-known and fringe Internet-accessing applications and games. We assessed the quality of the interface, determining if it was easy to navigate through general options for day-to-day use, and then drilled down to hardcore details for tweaking. We directed a critical eye to the suite's decision-making process: Did it automatically take the obviously correct action without bothering the user, and for those times when a question was necessary, was it worded unambiguously and did it present choices that weren't confusing?

Of course, we attempted to infect our test systems, as well, using 15 "typical" viruses you're likely to see as email attachments in late 2009 collected with our own honeypot mail servers, along with one "typical" infected thumbdrive (which on unprotected systems, automatically loads a virus when the drive is inserted). For fun, we also visited a "typical" scamware site that performs a bogus "instant AV scan," falsely "detects" viruses, and recommends you download and install its free "security suite," which then runs a convincing "full scan," detects tons of nasties, and then hits you up for $50 to clean what it "found." Oh, and it can't be uninstalled or disabled; after all, it is a scam. We used some XP systems and virtual machines for this testing, too.

We keep putting "typical" in quotes because, honestly, we don't really know how typical our admittedly small malware sample is compared to everything out there at any given time, and this deserves special mention. Nonprofits such as AV Comparatives test most of these products against *1.6 million* malware samples every few months, generally finding detection rates between 90 and 98%. These numbers don't mesh well with our 28 to 100% detection rates until you consider the huge difference in malware sample sizes we can bring to bear against these suites. We hope we have a valid data-point for comparison, but because we can't publish AV Comparatives' results, we encourage you to check out its Web site and reports for yourself at www.av-comparatives.org. For comparison, we provide other certifications, too.

If nothing else, AV Comparatives shows that given a big enough sample, no security suite detects everything, so you shouldn't accept our 100% detection rate as a license to download and run everything you find without using common sense.

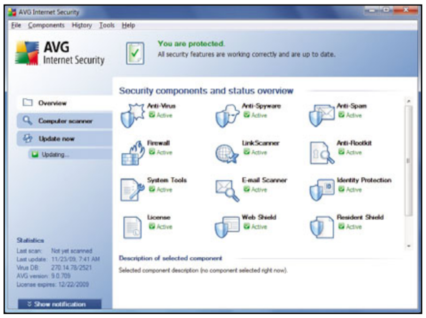
With that, here are 2010's contenders.

AVG Internet Security 9.0

AVG's free antivirus product is wildly popular, so we were somewhat surprised by the generally poor performance of the full commercial version (version 8.5) last go-round. What a difference .5 makes. Though not without some problems, AVGIS wins the "most improved" award by eliminating most of the confusing and annoying pop-ups that plagued the previous version. This time, when AVGIS encounters malware, it presents an unambiguous "Threat was blocked!" dialog box with just one button: Close. In other words, there isn't really a way to accidentally allow an infected file to run because you inadvertently clicked the wrong radio button.

The two-way firewall is also smarter, though it still isn't a genius. It let most, though not all, well-known Internet-accessing programs and games get online without prompting, simply displaying a pop-up stating a new firewall rule is being created for Steam, for example. The older version stopped apps dead in their tracks waiting for you to approve the rule.

We're not sure how to rate AVG's handling of the scamware. Its browser safeguards let us browse to the scamware site (though to be fair, only one product attempted to dissuade us), and it didn't block the automatic download of the installer executable. The AV engine allowed the installer to run, and our test system was soon infected and asking us



You are protected.
All security features are working correctly and are up to date.

Last scan: Not yet scanned
Last update: 11/23/09, 7:41 AM
Virus DB: 270.14.78/2521
AVG version: 9.0.709
License expires: 12/22/2009

Selected component description (no component selected right now).

AVG Internet Security 9.0
$54.95 (3-PC license)
AVG Technologies
www.avg.com
● ● ● ◖

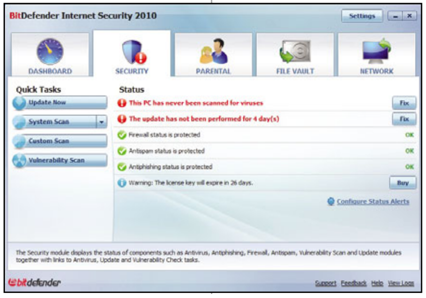
for money. A reboot, however, saw AVGIS successfully removing the scamware automatically. This is better than some products, but others didn't even let the installer run in the first place.

AVGIS is a mixed bag in other ways, too. Though it reduces 3D games' frame rates the least and doesn't slow down file operations much, the PCVantage benchmark was the second-slowest, and the firewall left port 554 wide open (not closed, not stealthed) to the outside world. Even Win7's and WinXP's built-in firewalls can stealth all ports below 1056. Its general interface hasn't changed much either: It's way too busy on the main screens, and a huge "settings tree" can be intimidating and makes finding specific settings too much of a hunt.

BitDefender Internet Security 2010

BitDefender makes a solid Internet security product that is confusing at first, but eventually manages to suit the needs of its owner, provided the owner isn't a hardcore gamer with a marginal system. There's no getting around it: Though it generally manages excellent speed through file-related operations, and it barely slows PCMark Vantage (just a 1% slowdown overall!), it just kills 3D gaming speed compared to its competition. On the other hand, we need to keep this in perspective: The 3DMark scores only vary 1.1% from best (no security product installed) to worst (AVG), and the Counter-Strike: Source frame rates vary only 4.4% from best (nothing installed) to worst (BitDefender). 4.4% is the difference between a dedicated sound card and a USB sound card, and if you're already getting frame rates in the hundreds, will losing 12 frames a second really matter? If you have a fast system, then it probably doesn't.

The installer peppers the user with the most questions and confusingly asks the user to identify their preferred interface level (Beginner, Intermediate, or Advanced) and their PC's primary use mode (Multimedia PC, Gamer PC, Kid's PC, or Custom). The first question makes sense (more in a moment), but the second is confounding: Most users use their PCs for all of that stuff, and not even the help file really explains the differences. The three interface levels mask complexity very well, showing what users really need to know, but you must switch into Advanced mode to make detailed changes. The "Beginner" interface is especially well-suited to beginners (i.e., your parents) and the Advanced interface very well-suited to power users.



This PC has never been scanned for viruses
The update has not been performed for 4 day(s)
Firewall status is protected
Antispam status is protected
Antiphishing status is protected
Warning: The license key will expire in 26 days.

The Security module displays the status of components such as Antivirus, Antiphishing, Firewall, Antispam, Vulnerability Scan and Update modules together with links to Antivirus, Update and Vulnerability Check tasks.

BitDefender Internet Security 2010
$49.95 (3-PC License)
BitDefender
www.bitdefender.com
● ● ● ◖

BitDefender's firewall isn't terribly smart, asking questions not only about well-known games and applications, but even Windows sending IPv6 info to Microsoft.com. It always handled malware correctly, however, just blocking it and letting you know in the case of traditional viruses, and correctly identifying the scamware based on its behavior and blocking it from running immediately.

CA Internet Security Suite Plus 2010

CAISSP is a throwback to the security suites of yesteryear, complete with a lengthy installation with silly questions, cryptic pop-up messages, inconsistent behavior, an interface that looks like no other program you've ever used, and just not a lot of smarts. Oh, and it also slowed down the benchmark system the most (though its 3D gaming scores are excellent) and is the most expensive.

Kudos to CA for making it easy to opt out of features you don't want or need during the installation; two checkboxes let you disable parental controls and the built-in file backup program, but the full installation takes five minutes plus a reboot—more than twice as long as any other product. CA deserves credit for blocking the scamware installer from running, but ironically, its Website Inspector browser toolbar identified the site itself as "low risk." Oops.

CAISSP did pretty poorly against our virus zoo, but because AV Comparatives hasn't tested the product, we can't really tell if this is a fluke. When detecting something, it displays two pop-ups: One identifies a suspect file, and the other appears a minute later with some options, including letting it run. If you do nothing, the file eventually gets deleted, but it's too easy to allow it to proceed by accidentally clicking the wrong button. Pop-ups are also the norm for apps that want to use the Internet (three for Counter-Strike: Source) and even some apps it doesn't recognize, such as TeraCopy (a bewildering 14 pop-ups). When we clicked the option to just Allow All and stop asking, it stopped asking all right, and TeraCopy wouldn't run anymore until we went into the CA settings screen and removed TeraCopy from its applications list. Then we got the pop-ups again.

Finally, its interface leaves a lot to be desired. Different sections of CAISSP are controlled via one of four panes that revolves around its window, but the information presented is scant and the language vague. The settings screen uses vague icons to divide settings into groups and is ultimately confusing.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

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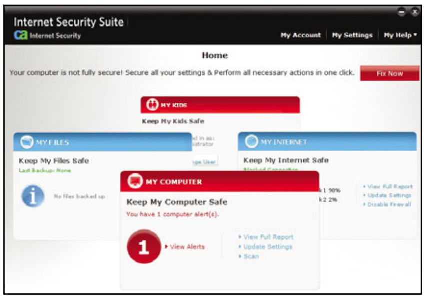
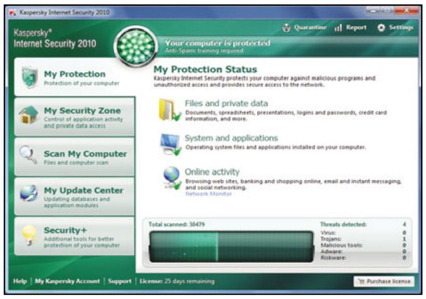


CA Internet Security Suite Plus 2010
$69.99 (3-PC license)
CA
www.ca.com
● ● ●



Kaspersky Internet Security 2010
$49.95 (3-PC license)
Kaspersky Labs
usa.kaspersky.com
● ● ● ●

Kaspersky Internet Security 2010

Say "Hello" to the only security suite that blocked every single piece of malware we threw at it, including those that were zipped up. To be fair, the two suites not configured to automatically scan within compressed files (McAfee and Norton) by default can be set to do so, and also, all suites able to block a specific uncompressed virus detected it in the ZIP file when we tried to extract the file manually, but Kaspersky did it right out of the box.

Kaspersky was also the only program to detect the malicious JavaScript in the scamware's host site and blocked it from executing, thereby preventing the scamware installer from downloading. When we manually disabled this protection and let it download, heuristics prevented the scamware's installer from running, displaying straightforward pop-ups that don't let users accidentally run malicious software. The new pop-ups are a big improvement over last year's version.

Another unique feature is Safe Run, which creates a "sandbox" environment for applications you aren't sure about the safety of. Applications running in the Safe Run environment don't have direct access to the file system or Registry, which is handy for testing out new programs or running programs that can be easily fooled into downloading things (such as IRC clients). A Safe Run Shared Folder lets you store files for later use with Safe Run.

Generally, the new user interface is well-organized and attractive, though a little busy. Its faux-radar screen looks like something you'd see on a "Mission: Impossible" agent's computer, but it's responsive and clear. Overall performance is basically mid-pack in all the tests, with 3D gaming being a little slower than average.

Kaspersky's only real blemish is the firewall test: Scanning a protected PC showed nothing but "closed" ports at the test's start, but after a few seconds, they all flipped to "steathed." In other words, the firewall adapted to the scan, locking down ports after a perceived attack. Given that other products can stealth all ports all the time successfully, we think this adaptive behavior only calls undue attention to the protected PC.

McAfee Internet Security 2010

McAfee Internet Security combines a bevy of features with an outstanding price, but the more we actually tested it for performance and security, the more we found it was outclassed by the competition.

Benchmarks

	3DMark Vantage: Average of at least three runsat default settings	**PCMark Vantage:** Average of at least three runs at default settings	**Counter-Strike: Source Benchmark Frame Rate:** Average of at least three runs at default settings of Video Stress Test	**Boot Time:** From first appearance of Windows Logo to beginning of a 15-second period of less than 10% CPU activity, averaged over at least three runs, in seconds	**Web Page Load:** Cumulative time to load a complex iGoogle page 10 times, as measured with Firebug extension	**Copy Files:** Time to copy 18GB of files from one SATA drive to another, including 1GB of office files, 7 GB of photos, and 11GB of MP3/AAC files, averaged over at least three runs
Clean System	5616	5563	291.73	30	9.55	5:56
AVG Internet Security 9.0	5558	4838	291.03	57	10.55	6:35
BitDefender Internet Security 2010	5564	5516	278.99	32	11.18	6:48
CA Internet Security	5597	4616	290.65	55	15.20	12:14
Kaspersky Internet Security 2010	5575	5143	281.11	35	12.73	15:34
McAfee Internet Security 2010	5593	5011	289.27	39	14.78	15:45
Microsoft Security Essentials	5585	5220	289.56	34	9.74	6:50
Symantec Norton Internet Security 2010	5580	5048	288.04	34	12.00	8:16
PCTools Internet Security Suite 2010	5581	5077	288.03	44	15.60	6:55

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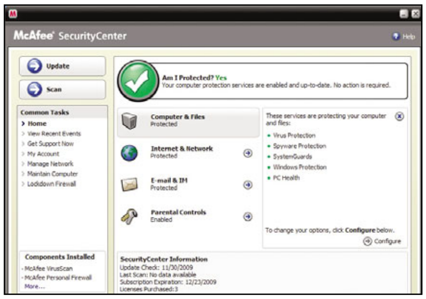
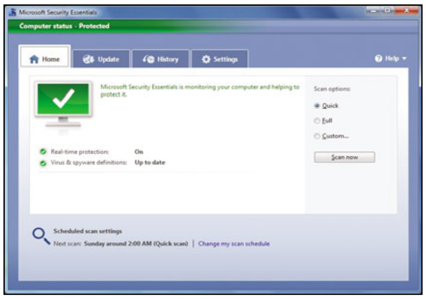


McAfee Internet Security 2010
$34.99 (3-PC license)
McAfee
www.mcafee.com/us
● ● ●



Microsoft Security Essentials
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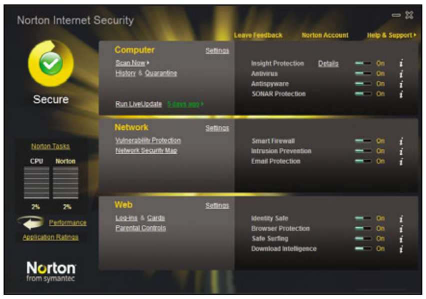


Norton Internet Security 2010
$59.95 (3-PC license)
Symantec
www.symantec.com
● ● ● ● ◖

Its malware detection rates for our sample zoo are quite good, though you need to manually enable compressed-file scanning to match the settings of most other programs. Its alert messages are clearly worded and won't let you accidentally let a virus run due to sloppy cursor placement. While all the suites have some sort of spam filter, McAfee's is among the best at weeding out spam with no prior training.

Unfortunately, McAfee permitted the scamware to download and install without a hitch, essentially ruining the test installation of Windows and disabling McAfee in the process. Its well-publicized SiteAdvisor browser helper didn't flag the host site as a distributor of malware, though a user could have clicked the "neutral" SiteAdvisor button and read the single user-written warning about the site, but one can't be expected to click a nonwarning SiteAdvisor button every time it's visible.

Like AVG, McAfee's firewall left port 554 open to our portscanner, but more troublesome was its ruleset. When installing an FTP server software package, a McAfee pop-up asked if we wanted to let this unrecognized program access the Internet, and we told it to allow Internet access. Despite this, we couldn't log in to the server until we also manually added a firewall exemption for port 21 (the FTP port). It's bad enough for a security suite to ask about a program once.

On top of this, McAfee was generally the security program that slowed down file operations the most. Even its GUI took a full four seconds to open. Let's hope the next version is more competitive.

Microsoft Security Essentials

Microsoft is in a tough spot. It knows Windows is vulnerable to viruses and malware, but what to do? When there was talk of adding built-in antivirus software

Zip Files: Time to zip up 1GB of office files, averaged over at least three runs	**UnZip Files:** Time to unzip 1GB of office files, averaged over at least three runs, in seconds	**Firewall Test Result:** Number of open ports facing the outside world upon a scan	**Time to open Interface:** Elapsed time from double-clicking Tray icon until the GUI becomes usable. Splash screens don't count	**Downloaded Infected Executables:** Blocked or Deleted, from sample of 15	**Downloaded Infected Zip Files Blocked/deleted,** from sample of 17	**VB100 Pass/Fail** (October 2009 Test)	**West Coast Labs' Checkmark Certification**	**ICSA Labs Certification**
2:16	29	All stealthed	n/a					
2:37	28	Port 554 open	:01.5	100%	30%	Pass	Certified	Certified
2:32	32	All stealthed	:02	91%	53%	Pass	Certified	Certified
3:04	50	All stealthed	:02	46%	65%	Pass	Certified	Certified
2:36	30	Stealthed*	:01	100%	100%	Pass	Certified	Certified
3:11	44	Port 554 open	:04	100%	0%	Pass	Certified	Certified
2:36	29	All stealthed	:01	91%	89%	Pass	Certified	Certified
2:35	35	All stealthed	instant	100%	0%	Pass	Certified	Not Tested
2:39	33	All stealthed	:04	28%	18%	Not Tested	Certified	Certified

* after a scan in progress

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

to Win7, the major security vendors had legitimate complaints about unfair competition, while pundits wondered if a company with a security track record such as Microsoft could be trusted to fight viruses at all. In the end, Microsoft has made MSE free to anyone using a genuine copy of WinXP, Vista, and Win7, making it sort of an optional add-on.

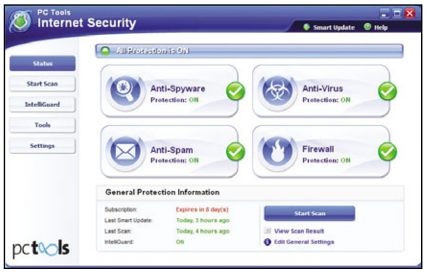
MSE isn't bad for a free product, though it is admittedly pretty basic and more comparable to the competition's straight antivirus products rather than security suites. It detected most of the bugs in our virus zoo, including those within ZIP files, though you have to manually turn on its ability to scan removable disks to protect against infected thumbdrives. Its GUI opens instantly, and it consistently scores above average in our performance tests. Pop-ups that appear when malware is detected are attractive, clear, and won't let you accidentally unleash anything. The minimalistic GUI is simple and elegant.

MSE is counting on Windows' own firewall and Internet Explorer 8 for Web security, and assuming you're using Vista or Win7, you should be OK. Win7 passed our portscan test with flying colors (beating three commercial firewall modules tested here), and IE8's antiphishing filters are about as good as any of the competition's.

MSE couldn't stop our scamware sample, failing to detect the installer for what and then clean the mess once it got in. These scams tend to fool noivces, which are the same users that tend to use free security software, so we sense a recipe for disaster. Still, if you can recognize scams, can't pay a dime for security software, and want your system to remain spry after it is installed, you could do worse than MSE.

Norton Internet Security 2010

When everyone's suites were bloated and slowing computers down, Symantec led the charge to focus on performance and speed; everyone (mostly) followed. Now that Web sites are spitting out custom-compiled, almost unique malware executables to each victim, Symantec's reputation-based file scanner is a new anti-malware weapon we think others will soon copy.



Subscription: Expires in 8 day(s)
Last Smart Update: Today, 3 hours ago
Last Scan: Today, 4 hours ago
IntelliGuard: ON

PCTools Internet Security Suite 2010
$49.95 (3-PC license)
PC Tools
www.pctools.com
●●●

Essentially, all Norton 2010 products send "fingerprint" information back to Symantec when new executable files are encountered into a master database online. The idea here is that safe files are routinely used by millions of users and are all identical, but new malware such as the scamware we tested against are each slightly different, and if only 10 people in the world encounter a specific downloaded executable, then it's probably malware. NIS handles this appropriately. The process is transparent and fast and should be able to handle zero-day outbreaks better than definition-based protection. Time will tell, but it handled the scamware installer correctly.

Traditional definition-based defenses are also used, and they did a fine job against our virus zoo, though NIS doesn't scan within compressed files by default. NIS2010 goes to great efforts to make security decisions for you and uses plain English to explain what it's doing, has an attractive interface that is simple and well laid-out, but has detailed configuration options organized intelligently, and it displays two CPU meters (one for the overall system and one for Norton programs) to prove that Symantec isn't responsible for system slowdowns. A new window shows historical performance data, which is neat.

NIS benchmarks were average throughout, but detection rates are solid and usability is super. Plus, we think reputation-based detection is the wave of the future.

PCTools Internet Security Suite 2010

PCTools is a relative latecomer to the security suite game, and based on the excellent performance of its ThreatFire product, we had high hopes for PCTISS. While it has many sterling qualities going for it, we can't ignore that it did the absolute worst at detecting our viruses, instead counting on its behavior-based malware detection to protect your system almost exclusively. This is akin to wearing a rain poncho to protect you from spilling coffee on yourself, but what you really need is a well-designed travel mug that prevents spills in the first place. In other words, detection of viruses went up when we actually executed the files, but the competition just deletes viruses before they can even be written to the disk. We don't think it's worth taking the chance.

However, our scamware test is a good example of how the behavior-based detection can work. Its installer was saved without interference, but upon running it, PCTIIS called it "suspicious," and offered to block or allow it. Choosing "Allow" (as a confused user might), it was blocked again by something called Behavior Guard, which identified it as malware.

Detection methods notwithstanding, PCTools offers a very friendly and well-organized interface, which, while slow to initially come up, is a joy to use. It invites exploration via logical screens yet shows beginners exactly what they need without much more. It's no surprise that a lot of scamware titles emulate this interface.

Recommendations

Last time, selecting winners was easy because two contenders outperformed the pack in terms of speed, detection rates, features, and smart interface decisions. This time, most of the products have improved their interface cues and their speed, so our recommendations had to be distinctive in other areas.

To that end, Norton Internet Security gets the nod for adding an innovative approach to malware detection to an excellent interface, feature set, and automatic decision-making tools. Techies wanting to make more of their own decisions should consider Kaspersky Internet Security 2010 as an alternative. ▲

by Warren Ernst

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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All other trademarks are the property of their respective owners. *When configured with one GTX 260M GPU and one WD Scorpio Blue 250GB HDD.

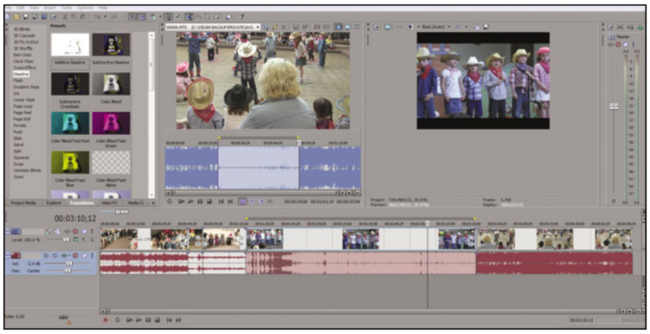
Sony Vegas Pro 9

It's hard to buy a digital camcorder (or even a digital camera) these days that doesn't shoot HD video, and finding the perfect program for editing that footage poses some problems. You can save some cash with consumer-level software that handles the job fairly poorly. The alternative is dropping a grand or more on a professional editor that requires a lot of training and is probably overkill for home users. Sony Vegas Pro 9 fills a sweet spot by offering nearly all of the functionality you get from those pro packages—more in some cases—while costing significantly less.

The main interface resembles Sony's consumer-level Vegas Movie Studio software but is highly customizable and packed with more features. One of the program's strengths is that it makes video files available instantly for editing after you drop them in. This includes 1080p AVCHD files that are often difficult to process using lesser software; Vegas Pro 9 churns through these files effortlessly on our run-of-the-mill 2.4GHz Core 2 Quad 6600 test machine with 4GB of RAM running Windows 7 64-bit (Both 32- and 64-bit versions are included). The standard timeline interface makes it easy to line up tracks; and scrubbing through audio and video is extremely precise.

Tons of professional-quality transitions and effects are included, and when you're finished editing, the software can output your creations to nearly any format or type of disc, including Blu-ray. The bundled DVD Architect Pro handles disc authoring like a champ.

The only conceivable weakness to this package is the lack of a printed manual. Even this is mitigated by the inclusion of some terrific interactive tutorials that walk you through the real interface instead of forcing you to watch a static video. If you're looking for something that handles any type of video you throw at it, all while providing an intuitive workflow and loads of effects, Vegas Pro 9 is your ticket to some great movies. ▲



by Tracy Baker

Vegas Pro 9
$539.96
Sony
www.sonycreativesoftware.com
●●●●●

Laplink Defrag Professional Edition

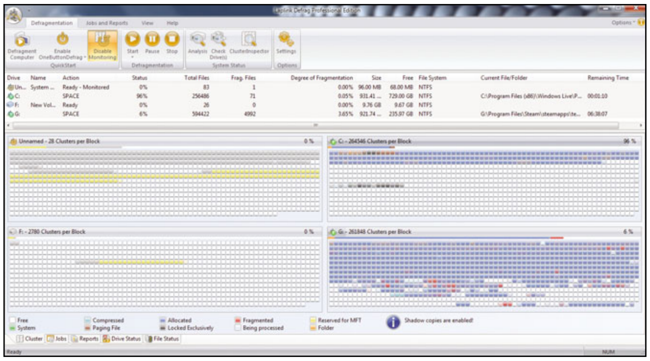
Windows already comes with a drive defragging tool, so why would you spend money on something like Laplink Defrag Pro? How about full automation, full transparency, and fast performance?

We tested the 64-bit version in Windows 7 and the 32-bit version in Vista. The software uses a streamlined interface reminiscent of Office 2007's Ribbon to keep everything accessible while hiding parts of the program you aren't using at the moment. Multiple panes display the status of multiple drives simultaneously, and the software does a great job of keeping you updated regarding the status of a defrag operation. It also labels blocks sensibly, generates detailed reports, and works quickly. Defragging 200GB with 5% fragmentation on a 1TB drive in Win7, for example, took about seven minutes, but performance will obviously vary depending on the type of drive you use.

If you don't want to defrag an entire drive, you can defrag files or folders via a context menu. Full scheduling is supported and easy to set up, and you can enable background monitoring to keep the PC defragged on the fly. We enabled background monitoring and performed a variety of other resource-intensive tasks, such as video editing and 3D gaming, and didn't notice any slowdown. Defrag Pro did a good job of staying out of the way.

The flip side is that using Laplink Defrag didn't appreciably increase performance in any of our test machines. This isn't necessarily a flaw with the software, it's just that defragging relatively modern drives in Vista and especially Win7 isn't as big an issue as it was in the past. Certainly an optimized drive runs better than one that has chopped up files strewn all over the place, but we're not talking about the night-and-day difference that spending money on a hardware upgrade makes.

Laplink Defrag Pro is less expensive than any of those options, but considering excellent free alternatives, such as MyDefrag (www.mydefrag.com), we have a hard time recommending this software. ▲



Drive	Name	Action	Status	Total Files	Frag. Files	Degree of Fragmentation	Size	Free	File System	Current File/Folder	Remaining Time
Un...	System ...	Ready - Monitored	0%	83	1	0.00%	96.00 MB	68.00 MB	NTFS		
C:		SPACE	96%	256486	71	0.05%	931.41 ...	729.00 GB	NTFS	C:\Program Files (x86)\Windows Live\P...	00:01:10
F:	New Vol...	Ready	0%	26	0	0.00%	9.76 GB	9.67 GB	NTFS		
G:		SPACE	6%	594422	4992	3.65%	921.74 ...	235.97 GB	NTFS	G:\Program Files\Steam\steamapps\te...	06:38:07

by Tracy Baker

Defrag Professional Edition
$29.95
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●●◖

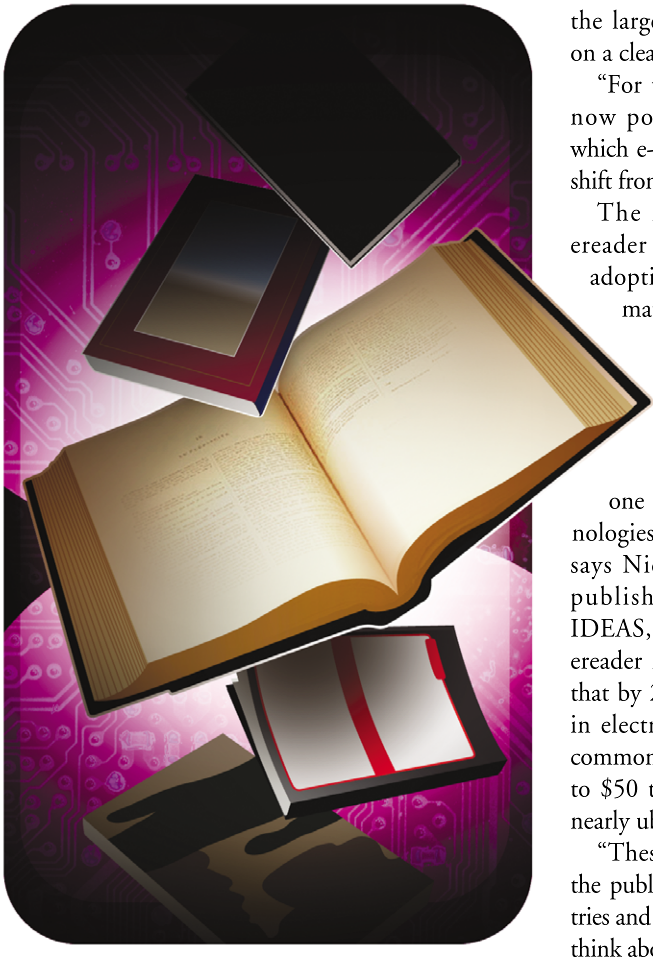
CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

The War Of The Words

Legal & Tech Battles Over The Digital Future Of The Book

The Internet seems to have changed almost all of our relationships to old media, including television, newspapers, and mail. The ways we consume all of these legacy media have been profoundly affected by the Web. But the oldest mass medium of all, the book, remains a holdout. Amazon.com, of course, permanently altered the way we shop for books, but the actual reading experience itself has not translated quickly at all to the Web, despite more than a decade of false starts. In the last quarter of 2008, U.S. wholesale ebook sales amounted to a relatively paltry $16.8 million, according to the International Digital Publishing Industry Forum.

This year, however, the rate of ebook sales has gone into hyperdrive, with third-quarter sales up to $46.5 million. Many in the industry are already declaring 2010 the "year of the ebook," and analysts predict for the book publishing market the same kind of digital earthquake that rattled music CDs and print newspapers in the last decade. There are fortunes to be lost and made in this war of words, and new and old players are entering the fray: Amazon, Barnes & Noble, and now Google and even Sony.



Battle Of The Gadgets

"There is much evidence that the ebook as a format for reading is finally taking off for users," says James Grimmelmann, associate professor at the New York Law School and a participant in the Institute for Information Law and Policy (www.nyls.edu/infolaw), which studies the legal and cultural implications of digital media. For over a decade, ebooks occupied a small niche market of those who were comfortable reading lengthy text on a desktop screen. Few people believed that the Web would replace the handy, portable book.

But now that ereaders such as Amazon's Kindle, Barnes & Noble's nook, and others are giving ebooks some of the readability and portability of the "original," the market seems to be shifting rapidly. When Dan Brown's long-awaited follow-up to "The DaVinci Code" appeared in September 2009, Double-day reported that 5% of sales, or 100,000 copies, were sold in ebook versions. Although that's still a fraction of the larger print market, ebooks are on a clear growth trajectory now.

"For the first time in awhile, it is now possible to see the curve by which e-sales will start to significantly shift from print," says Grimmelmann.

The new and coming wave of ereader devices clearly are driving adoption of the digital book format, and here a major skirmish has broken out not just among device manufacturers but also among business models.

"E-paper ereaders will be one of the major disruptive technologies of the early 21st century," says Nick Hampshire, analyst for publishing consultancy media-IDEAS, in his latest report on the ereader market. Hampshire predicts that by 2020, technological advances in electronic ink devices will bring common prices for these units down to $50 to $60 each and make them nearly ubiquitous.

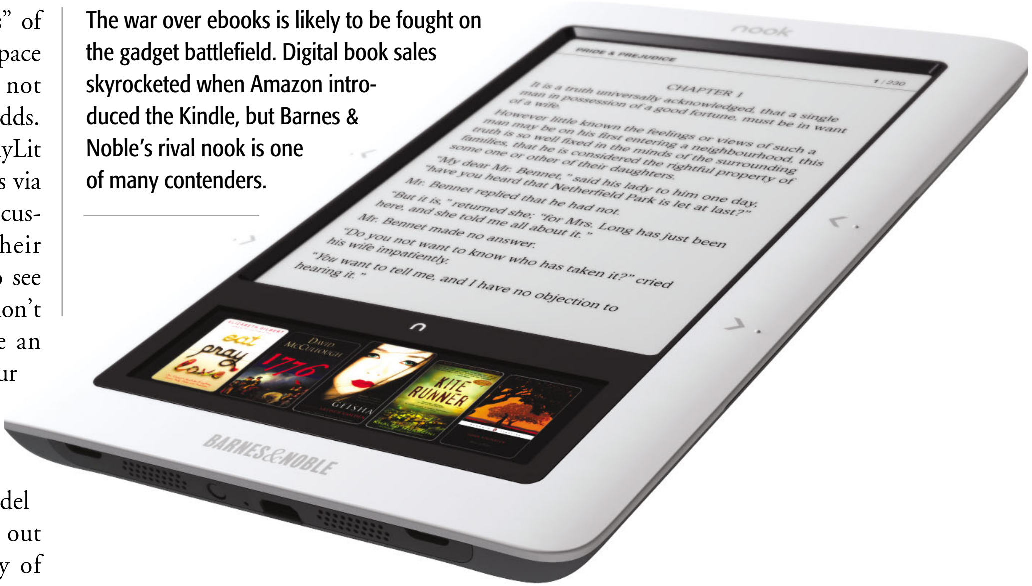
"These devices will revolutionize the publishing and advertising industries and change the way we all use and think about print media," he says.

But many wonder whether the dedicated ebook reader will be the platform of choice for digital books. The smartphone has become a surprise contender in this race. Mobile metrics firm Flurry revealed that in October, one out of every five "apps" launching in the iPhone App Store were actually books.

"We can do different kinds of stuff on the iPhone, from kids books to graphic novels," says Josh Koppel, founder of ScrollMotion (www.scrollmotion.com), which brought Stephenie Meyer's "Twilight" series, among others, to the App Store. Koppel says his readers spend about 15 minutes per session and use the ebook on phone as brief "interstitials" of reading during the day. "This is a space with unlimited potential, and it is not tied to any one technology," Koppel adds.

For Susan Danziger, CEO of DailyLit (www.dailylit.com), which sells ebooks via email distribution, a quarter of her customers already access books via their phones. (See sidebar.) She expects to see converged technology dominate. "I don't see in the future that we will have an ebook device that is separate from your phone or your computer. I think they all will be merging."

The war over ebooks is likely to be fought on the gadget battlefield. Digital book sales skyrocketed when Amazon introduced the Kindle, but Barnes & Noble's rival nook is one of many contenders.



But first everyone has to settle on a pricing and distribution model for digital tomes. Amazon was first out of the gate with the Kindle family of readers, which tied a customer's ebook purchases to that seller's proprietary hardware. But despite good early PR, the Kindle's market dominance isn't a done deal. Ongoing tension over formats and pricing with Amazon (the online bookseller often sells $25 hardcovers for $9.99 on the Kindle and presses publishers for deep discounts) are driving publishers to embrace powerful rivals in the ebook wars, especially Google.

"[Publishers are] all terrified of Amazon," says Grimmelmann. "Publishers worry about Amazon taking too big a cut of its own. They are hard, hard negotiators and demand strong discounting provisions in their contracts."

Both Barnes & Noble and Sony entered the market this holiday season with their own ereaders, trying to appeal to consumers and publishers with more flexible models. Both devices will support the .EPUB ebook publishing format, a standard book file format developed by the International Digital Publishing Forum (www.idpf.org) that doesn't tie an ebook to specific hardware. Although the format can still carry DRM protection to prevent wholesale copying of copyrighted works, a universal format allows ereaders to operate across a number of different storefronts and download a wider range of free public domain ebooks. Anything that frees the ebook from Amazon's tight grip on the market is fine with many publishers, so it's not surprising that powerhouses such as HarperCollins and Random House are throwing their support behind this format.

> " I don't see in the future that we will have an ebook device that is separate from your phone or your computer. I think they all will be merging. "
>
> Susan Danziger, CEO of DailyLit

Enter Google . . . & The Lawyers

Google as a hedge against Amazon? The ebook wars developed some strange alliances in 2009. Suddenly, last year, the 800-pound gorilla of online search stepped onto the ebook battlefield in a big way by declaring its intention to start selling some of the books it has been actively scanning for the Google Books repository. In the last several years, Google has scanned more than 7 million books from libraries and institutions around the country to make them searchable in its search engine. This practice, which lets online searchers see only "snippets" of the original book, was challenged as a violation of copyright by the Authors Guild (www.authorsguild.org) and the Association of American Publishers (www.publishers.org) in 2005. For its part, Google claimed it was following the fair use provisions of copyright law that allows small samples of a protected work to be reused for editorial purposes.

By 2008, Google had negotiated a settlement in the class action lawsuit, which paradoxically unleashed a maelstrom in the otherwise staid world of book publishing. The complex proposed settlement actually expanded, rather than restricted, Google's use of scanned works. The agreement would have let Google show up to 20% of a book on its search engine, and it would share any ad revenues it gathered on those pages with the authors and publishers through a special Book Rights Registry. Authors would have the option to opt out of the system and remove their books from Google's index, but Google would also be able to make full use of so-called "orphan books," titles whose authors can no longer be found. In the meantime, Google announced last summer it wanted to start selling these ebooks, too.

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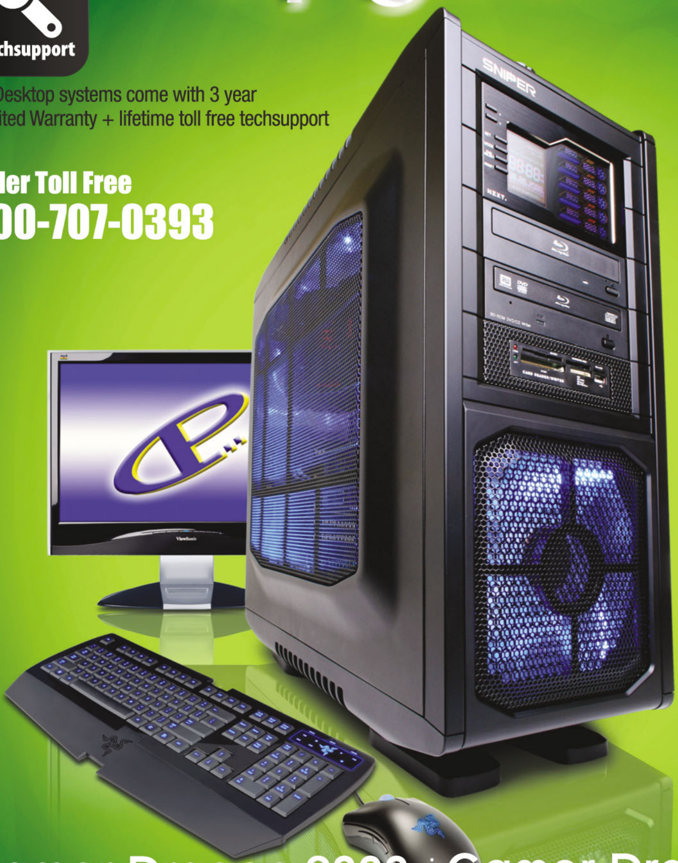

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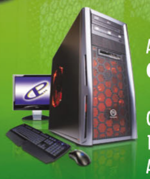

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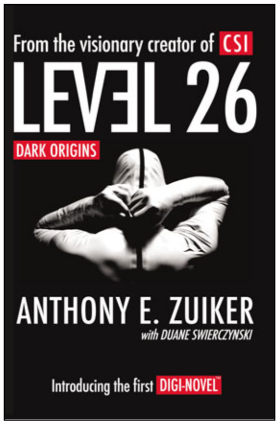
This was when lawyers from all quarters swooped in to argue that Google was negotiating for itself a privileged position in the future of ebooks. Groups such as Microsoft and the National Writers Union (nwu.org) are now part of a collation called the Open Book Alliance (www.openbookalliance.org), which complains that the proposed settlement is handing Google virtually exclusive rights to millions of books without a fair legal or governmental review.

"The deal would create a *de facto* exclusive license for Google because the deal grants no rights to the Book Rights Registry to license books to competitors," the OBA claims in a public statement. Gimmelmann worries that allowing the parties to settle copyright law through a civil class action suit doesn't allow all of the concerned parties to be heard. "There were plenty of opportunities for authors and publishers to control how their books were used but no provisions for orphan works."

Rebooting Gutenberg

The current wars over copyrights and business models notwithstanding, some in the industry are looking beyond the current war over words and hoping that digitization means more than just pouring text into devices. Innovations such as Vook, which commingles video clips with standard novels and is distributed on the iPhone, are popping up. A new serialized multimedia extravaganza, "Level 26," is a physical book, but its readers can go online to unlock HD video "cyber-bridges" between chapters. This novel/video/Web site combination is designed by one of the creators of television's "CSI" series and is also available as an iPhone app.


From the visionary creator of CSI
LEVEL 26
DARK ORIGINS
ANTHONY E. ZUIKER
with DUANE SWIERCZYNSKI
Introducing the first DIGI-NOVEL

Innovative projects such as "Level 26," from the creator of "CSI," try to combine traditional books with online video, illustrations, and mobile applications.

This is the direction in which the declining book industry must head if it wants to remain relevant, says Danziger. "Publishers need to look at their content and reinvent themselves and reinvent how people engage with their content. We are on the verge of something really exciting where content will take on a whole new life." ▲

by Steve Smith

The DailyLit Takes a Novel Approach To Ebooks

The Web not only lets publishers digitize one of the oldest media but also invites them to reimagine the age-old book. Susan Danziger, founder of DailyLit (www.dailylit.com) turns full-length novels and nonfiction favorites into email. The daily 1,000-word installments of a book can be read in a few minutes each day on the desktop or on a cell phone. Danziger, a former staffer at Random House, says users are embracing new ways of reading.

CPU: How did you come up with this idea of email books?

Danziger: A few years ago, *The New York Times* serialized some works in a special literary supplement, the same way Charles Dickens novels did [in the 19th Century]. My husband and I thought it would be neater to get the installments in the inbox. We created DailyLit for ourselves, then showed it to friends, and they asked us to add titles. It evolved from what readers wanted.

CPU: What are the typical usage patterns of people reading books via email?

Danziger: 1,000 words a day seems to fit well. We studied Dickens, and his weekly serials were about 5,000 words. You can get the next installment right away, get them at different delivery times, and stop and resume them if you go on vacation. Most people get them in the morning, but some like the late afternoons and call it their cocktail at the end of the day. We have served over 25 million book installments since we launched in 2007.

CPU: It sounds like TiVo-style time-shifting for reading. It must be a bit of a technical trick to deliver each email according to its own schedule.

Danziger: I was lucky. I married someone with a Ph.D. from MIT in Information Technology who programs for fun. It was originally homegrown. It takes a smart person to create a really simple platform.

CPU: Considering so many people now access their email on phones, DailyLit seems like a natural fit for mobile.

Danziger: We are projecting that about 25% of folks are reading on their cell phones already. But most of us go back and forth. I go from my BlackBerry to my laptop. We actually did build an iPhone app but decided after quite a bit of time and money at the last minute not to launch it. I recognized it was not going to be absolutely fabulous, and there were other apps at the time that were really great.

CPU: What do you think has held the ebook format back from great market success so far?

Danziger: [The public's] view of ebooks even today is limited. There hasn't been much experimentation. There is so much to be done with content. The idea of the ebook can reinvent itself and shape itself to integrate with people's lives, whether it is the email model or these new multimedia platforms. ▲

by Rob "CmdrTaco" Malda

magic.txt

Apple has had a long and confusing relationship with the mouse. In the '80s, the company popularized the input device: Up until the Macintosh made the mouse commonplace, it was the stuff of research. But when Steve Jobs visited the Xerox PARC and saw the first real mouse and GUI, the world changed.

Apple's original GUI needed just a single mouse button. In the years that followed, others (most notably Microsoft) popularized mice with multiple buttons, but Apple refused to budge: standing strong with a single infuriating button, even as the world moved on to two and even three buttons. Eventually, the Microsoft IntelliMouse set the standard, and the scroll wheel became the de facto standard on almost every PC shipped.

Meanwhile, Apple went in the opposite direction, shipping one of the worst mice of all time with the iMac. The hockey puck mouse was round.

Perfectly round.

So users would routinely grab from the wrong angle. Frustrating doesn't begin to describe grabbing your mouse and watching your cursor shoot off at a 20-degree angle from where you expect it to go!

Apple made a strong comeback with the Mighty Mouse, which replaced the scroll wheel with a scroll ball and made it possible to left- and right-click. The new mouse caught up with the rest of the world but still wasn't the best mouse around, as it was a little light, and the scroll ball gunked up easily. And if you happened to shell out for the Bluetooth version, the battery life and latency would soon have you crawling back to anything else.

But now Apple has given us the Magic Mouse, an optical, Bluetooth-connected device that aims to put Apple on top of the market that it once defined. The new mouse is Sleek. Solid. Attractive. And it has a solid heft to it that makes it feel of quality.

But far and away its most striking feature is that its entire surface is a trackpad—there are no scroll wheels or scroll balls anywhere in sight. Instead, simple finger swiping does the job.

This new innovation is surprisingly amazing. You can swipe forward and back through pages in your browser. You can swipe up and down within your page. And the same momentum scrolling that you have used on the iPhone is available here, making everything "just work" as you would expect.

But all is not perfect. My biggest complaint is consistency; the multi-touch stuff included in the most recent generation of MacBooks is surprisingly useful. The use of three- and four-finger gestures for things like task switching quickly becomes a convenient time-saver. And, of course, the pinch function is so transparently intuitive that I couldn't imagine an iPhone without it. But the touch controls Apple has given the iPhone, the MacBook, and the Magic Mouse are each slightly different. It's likely not practical to provide the same level of control from a mouse, but the fact that it's missing makes the trackpad a more useful input device.

The mouse is also a little too low to the table. I don't have Hulk hands, but I think the mouse might work better for me if it was just a bit thicker. I wish the edges were a bit rounder: I tend to grab the corners of this mouse. And the default OS X settings have the pointer moving comically slow. At least that one is fixable in the preferences.

But for me the question is this: If I put my laptop on a desk and the mouse to my right, will my hand wander to the mouse instead of the trackpad? After several days, the answer is no. But if you have an old mouse on a desktop computer where a trackpad isn't available, will you find this an improvement? It probably depends on what kind of mouse you had to begin with. I would happily toss any of the three mice I regularly use (a Logitech, a Microsoft, and a Mighty Mouse) in favor of the Magic Mouse, but my mice are all cheap. If you have one of those expensive high-resolution mice with lots of extra buttons, I suspect you'll still find the Magic Mouse to be a bit of a downgrade. ▲

Contact me at malda@cpumag.com

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

CPU
Game Of The Month

CALL OF DUTY MODERN WARFARE 2

$59.99 (360, PS3, PC)
ESRB: (M)ature • Activision
modernwarfare2.infinityward.com

Action-Packed Blockbuster — *by Dr. Malaprop*

Call Of Duty 4: Modern Warfare approached its final minutes with a harrowing, high-speed chase with you in the boots of SAS Sergeant "Soap" McTavish. The game culminated with a dramatic takedown of a Russian Ultranationalist named Imran Zakhaev, sold a ton of copies, and reviewed very well. It was a solid blockbuster thanks to the excellent campaign and a genre-defining multiplayer mode.

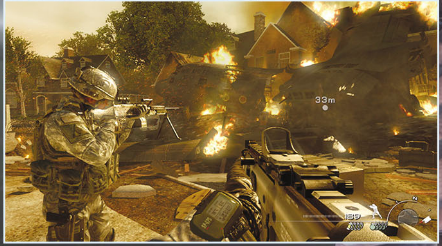
Modern Warfare 2 picks up five years later with the Ultranationalist party taking power in Russia. Zakhaev is being hailed a hero in his motherland, and his former protégé, Vladimir Makarov, is committing acts of terrorism. One such act you'll be able to experience personally after infiltrating Makarov's organization is to accompany him on a murderous spree at a civilian airport. Many have deemed this level offensive, so developer Infinity Ward lets players skip it without a penalty. To say more about the plot would be spoilerific, but this sequel has zero aspirations to plausibility. Think Jerry Bruckheimer's "The Rock" combined with Tom Clancy's more far-out conspiracy and military technology fare. The music is even composed by Hans Zimmer of "Crimson Tide," "The Rock," and "The Dark Knight," to name a few dramatic action scores.

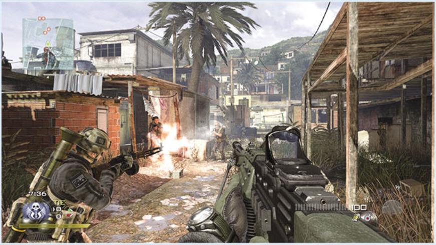
The wild twists and turns you'll experience as the narrative jumps around can make the single-player campaign narrative difficult to follow (and swallow), but the core FPS gameplay that leaps between characters, concurrent events and locations, and scripted set pieces does not let up. At Normal difficulty, you can easily complete the 18 chapters of the campaign in less than eight hours.

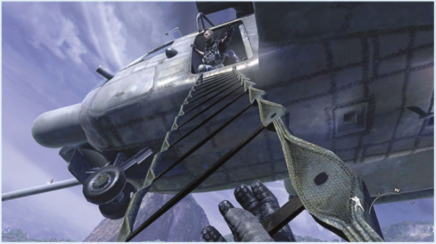
Upon completing the campaign, you'll want to jump into either the co-op Special Ops mode (also playable solo) or competitive multiplayer. Special Ops has 23 scenarios taken from the campaign and set to a variety of objectives that you and a friend can enjoy either via split-screen on consoles or online. The meat of the multiplayer experience is competitive. You gain experience and unlock the ability to use equipment, weapons, and Perks. We were especially fond of calling in Predator missile attacks on hapless battlefield enemies—death from above.

The original Call Of Duty was a PC-only game, so PC gamers may have a bone to pick with the developer. Yes, you'll get keyboard and mouse support, but none of the other things you expect with a multiplayer shooter. There's no dedicated server support, a maximum of 9 vs. 9 in competitive multiplayer, and no support for console commands. PC gamers will be forced to go through IWNET for multiplayer matchmaking. We were also disappointed with the removal of the Party Chat option on the Xbox 360; instead of just listening to friends, we're stuck listening to language we'd rather avoid.

Modern Warfare 2 lives up to its high expectations with more weapons, drama, action, set pieces, variety, twists, multiplayer modes/options and, um, more Modern Warfare. If you loved the original, then this is a sure thing. We felt a little less invested in the characters here than the first game and more critical of the existing PC limitations. But this is a must-play for anyone who liked the original and for any FPS or action gaming fan. Multiplayer gives MW2 big bang for the buck. You'll find beauty in the sometimes stark detail. Come for the campaign, stay for the multiplayer, and pine for an inevitable sequel. ▲







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DRAGON AGE ORIGINS

$59.99 (360, PS3); $49.99 (PC)
ESRB: (M)ature • Electronic Arts
dragonage.bioware.com

BioWare Crits You For Over 9,000—Again – *by Chris Trumble*

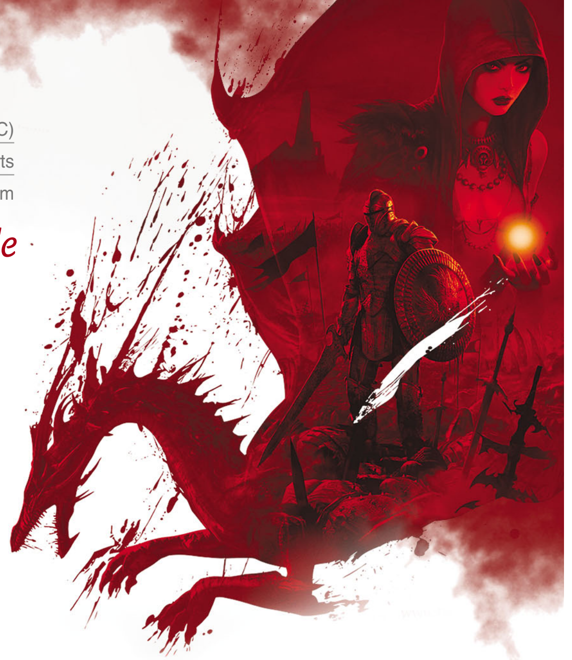
There are some developers that just have it figured out, and BioWare is one of them. The latest BioWare game, Dragon Age: Origins, is every bit as good as the company's past hits, titles such as Baldur's Gate, Mass Effect, Star Wars: KOTOR, MDK2, and so on.

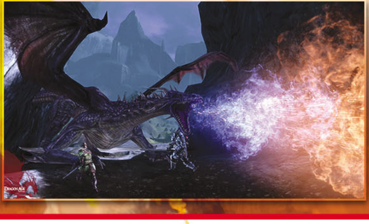
The main premise of the RPG's story is a well-worn fantasy staple: A great land is on the brink of a dark, bloody conflict with an ancient evil, and only you can save the day. In this case, however, who "you" are is hardly carved in stone. You create your character by choosing a gender, one of three races, one of three classes, and one of several back stories—thus the "Origins" portion of the game's title. (You also have a staggering slate of choices as to how your toon looks.)

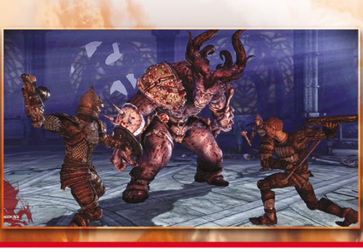
There is, of course, plenty of overlap regardless of how you choose, but your choice does affect how NPCs relate to you and plays a large role in how the game begins. Eventually, you become a member of the Grey Wardens, an ancient, mysterious order of warriors, mages, and rogues dedicated to battling the Blight, or massive incursions of evil darkspawn.

As you navigate the world of Dragon Age, you will fight lots of stuff; this plays out in an engaging blend of real-time combat and real-time strategy. You can quickly and seamlessly jump to any of the four members of your party and use their abilities in real time, or you can tap the Spacebar at any time to pause the action so you can give your troops specific direction. Or, if you're a laissez-faire strategist, you can set custom tactics for your characters beforehand and let 'em scrap.

Dragon Age: Origins controls well, looks decent, sounds fantastic, and is packed with interesting characters and dialogue. It's far and away the best single-player RPG in a long time. ▲







ASSASSIN'S CREED II

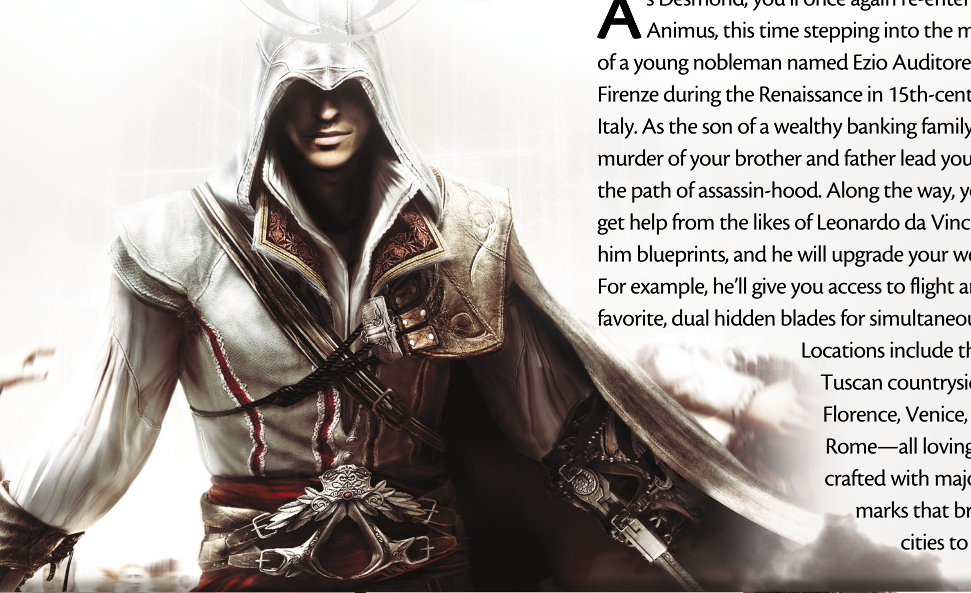
Renaissance Story – *by Dr. Malaprop*

$59.99 (360, PS3) • ESRB: (M)ature • Ubisoft Entertainment • assassinscreed.com

As Desmond, you'll once again re-enter the Animus, this time stepping into the memory of a young nobleman named Ezio Auditore da Firenze during the Renaissance in 15th-century Italy. As the son of a wealthy banking family, the murder of your brother and father lead you down the path of assassin-hood. Along the way, you'll get help from the likes of Leonardo da Vinci. Bring him blueprints, and he will upgrade your weapons. For example, he'll give you access to flight and, our favorite, dual hidden blades for simultaneous kills. Locations include the Tuscan countryside, Florence, Venice, and Rome—all lovingly crafted with major landmarks that bring the cities to life.

The original Assassin's Creed led us to marvel at the environments and how naturally we could scale buildings and traverse the rooftops, but ultimately it felt repetitious. Ubisoft heard the feedback and has improved the game in nearly every way. There are plenty of opportunities to follow marks, deliver packages, and, naturally, assassinate targets. We liked the longer missions, which now often require checkpoints, and we liked how we could buy weapons and armor from blacksmiths, health potions from doctors, robe dyes from tailors, and maps from art stores. Collectibles, such as chests, feathers, and codex pages, provide even more to do. You also own a villa, which can be upgraded to draw tourists and generate money.

Combat now consists of an expanded set of moves, and battles are often much larger-scale affairs. You can still blend into groups and pay for help in distracting guards, but now you can also swim and use boats. At least one thing is the same, however: The bird's-eye view of the city still gives us goose bumps. ▲



FORZA MOTORSPORT® 3

Car Culture Deluxe – *by Dr. Malaprop*

$59.99 (360)
ESRB: (E)veryone
Microsoft
www.forzamotorsport.net

Forza Motorsport 3 has a ton of content, hence the two-DVD package. The second disc is an optional hard drive install and includes additional tracks and cars. There are 22 racing locations, with most featuring several track layouts. These include both fantasy courses and real ones, such as Nurburgring and Sedona Raceway. Those wary of hardcore racing sims can enable all of Forza's in-game assists. You'll hold down the accelerator and focus on steering along track-drawn racing lines. Incrementally turn off assists and be rewarded with greater earnings and accomplishments. With assists completely disabled, this becomes a hardcore console sim racer. As with Need For Speed: Shift, there's a penalty-free Rewind feature.

Career mode breaks down by calendar seasons. Your championship races occur on the weekends, and the weekdays are filled with car classes, endurance tests, etc. You can tune cars manually or use the game's automatic quick tune feature. Online multiplayer supports eight players with plenty of race modes. Casual racers can test drive million-dollar supercars through Quick Race, two-player split screen, or Hot Lap modes. Creative players can even design and sell custom decals and cars, upload in-game photos, and post video replays.

External car models are stunning, but in-cockpit views don't match NFS: Shift. The driving experience feels fast, but Shift felt faster. Still, Forza 3 runs at a buttery 60fps, and there's never a hiccup in performance. Environments are excellent, and vistas of mountains or seasides are breathtaking. Forza 3 has depth, community, and gameplay for every type of player. It needs to be on your short list if you have any interest in cars and is quite possibly the best track-based racer ever. ▲

TORCHLIGHT

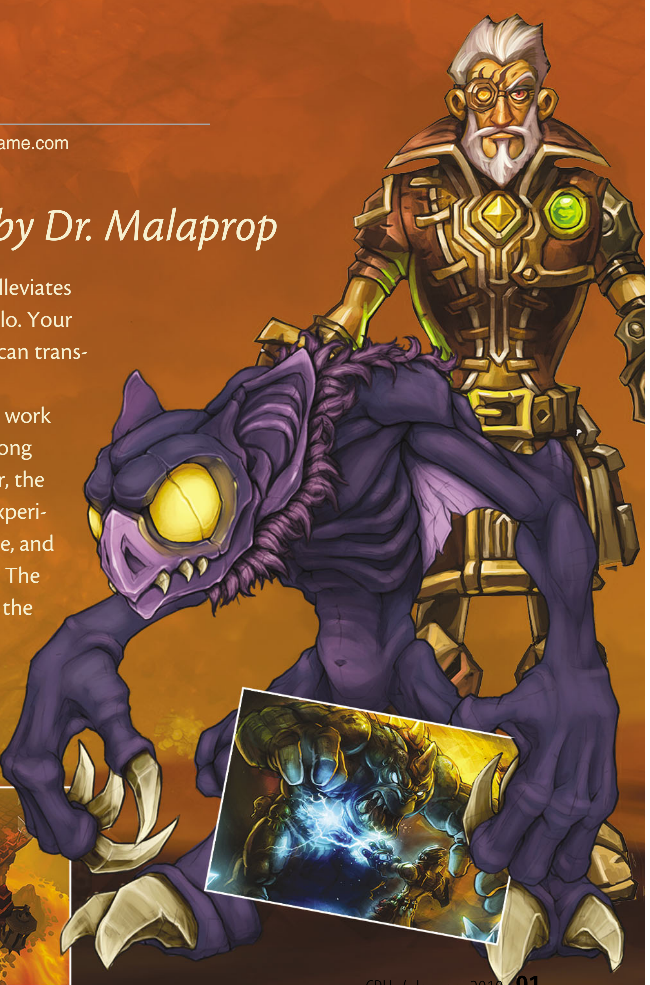
$19.95 (PC) • ESRB: Pending
Runic Games • www.torchlightgame.com

Perfect While You Wait For The Next Diablo – *by Dr. Malaprop*

Torchlight is the best Diablo clone since the last Blizzard release, albeit with a more modern spin. Sure, it's really a simple hack-and-slash RPG with a clean, easy design for leveling up and collecting loot. Your character options are limited to warrior-, mage-, and ranger-style classes. As you gain skill, you'll find your strategic thinking will focus on character building. You can also retire your character and pass along a favored piece of equipment to the next character as an heirloom.

Unlike Diablo, there's minimal narrative and no co-op mode. Torchlight is for single-player gamers only. Still, you aren't alone in the game. You have a pet cat or dog able to venture to town to sell your loot, which alleviates one of the complaints we had about Diablo. Your pet will also take on weaker enemies and can transform into other creatures.

You'll be challenged by 35 floors as you work your way to taking on the boss demon. Along the way, you'll solve light puzzles. However, the focus stays on the heavy mouse-clicking experience of Diablo. The progression is addictive, and we whiled away many lost hours in a flash. The lack of co-op mode was obvious, but with the updated art style and bargain price, we really don't have anything substantive to complain about. It's a great value play that even runs on a netbook. ▲

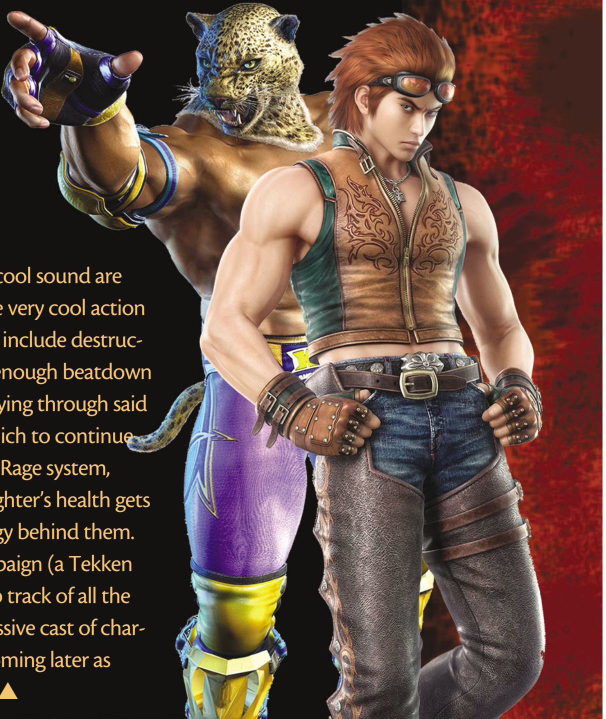


TEKKEN 6

$59.99 (360, PS3) • ESRB: (T)een

Namco Bandai Games • tekken.namco.com

Oh, It's On Now – by Chris Trumble



In a nutshell, the latest installment of Namco Bandai's most excellent fighting game Tekken is basically everything a fighting game fan could ever think of to ask for.

Tekken 6 continues the story of the Mishima family, a dynasty of power-hungry martial artists who have progressed from terrorizing Japan to making global trouble. Jin Kazama, grandson of Heihachi Mishima, has taken over the family business, Mishima Zaibatsu, and basically declares war on the world. This makes his father, Kazuya Mishima, very put off, and Kazuya pits the resources of the G Corporation against those of his son. There are lots of subplots, as well, including the unearthing of the demon Azazel, but the upshot is that this game packs more playable characters (40) than any of its predecessors.

The series' trademark good looks and cool sound are back, and this time the stages (which have very cool action taking place all around them as you fight) include destructible walls and floors. If you put a serious enough beatdown on your opponents, you can send them flying through said walls and floors, revealing new areas in which to continue the pummeling. The game also has a new Rage system, which essentially means that once your fighter's health gets low enough your attacks have more energy behind them.

Add to these things the Scenario Campaign (a Tekken Force-like story mode that helps you keep track of all the plots and subplots behind the game's massive cast of characters) and an online play mode that is coming later as DLC, and you have one heck of a dustup. ▲

PSPgo

New Recipe, Still Half-Baked – by Steve Smith

PSPgo ● $249.99

Sony ● us.playstation.com

●●●

The fundamental problem with the original Sony PSP has always been that the heavy slab just wasn't portable enough. The PSPgo's flip-up design puts the buttons and analog stick beneath a screen that is only about half an inch tinier than its predecessor. PSP gaming is now as pocketable as an iPhone. And with Bluetooth support now built-in, the unit has a new versatility for VoIP and future connectivity.

As a gaming handheld, the PSPgo hardware is good enough. The positioning of shoulder and volume buttons behind the extended display can get cramped and awkward in action gaming. A second analog stick would've made FPS gaming easier, but the button action and grip are fine. The screen shows some signs of interpolation with text but generally is brilliant for games and video. Whatever the compromises, the big win for the PSPgo is true portability; you will play some of its excellent games more often. We certainly did.

In part, the PSPgo slims down by jettisoning the bothersome UMD portable disc technology and adopting a digital download system of distribution. All games must be purchased from the Playstation Network. A 16GB flash drive provides onboard storage, so load times are faster. But now you will need to manage storage across the driver and removable Memory Stick Micro cards. A game like GTA: Chinatown Wars can consume 1GB of space. At launch, the full library of past UMD titles was not available on the PlayStation Network, so PSPgo owners are left waiting and seeing how deep their game choices will run. We also don't understand why a device so dependent on Wi-Fi only manages 802.11b speeds.

We love the portability of the PSPgo, but it comes at considerable cost—the $249 price tag is too high. Worse, Sony provides no upgrade or trade-in program for current UMD owners, so their previous investment is wasted. There are some great games for the PSP platform, and this device will let you play them more often. But should Sony be treating its best evangelists of the PSP like castaways? ▲

Rise to the Golden Age

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by Barry Brenesal

Windows: The Early Centuries

Windows 1.0 did not enter the marketplace full grown, an Athena popping out of Zeus' migraine. For a while, it was even vaporware. Announced in 1983, it only showed up toward the end of 1985, in order to capitalize on the holiday season. Sales were slim—not surprisingly, since it appeared subsequent to Digital Research's remarkably memory-efficient GUI, GEM, and Berkeley Softworks' GEOS, while the king of the hill remained Visi On by VisiCorp (the developers of the popular spreadsheet program, VisiCalc). At that early stage, Windows was neither an OS nor a multitasker. There were as yet no program groups, no overlapping windows, and no screen icons; just a list of files. It provided a graphical calendar, a Control Panel that controlled almost nothing, Notepad with only fixed fonts, terminal emulation, and both Microsoft Paint and Write. Underwhelming it certainly was, but Gates presumably wanted something out there to show investors.

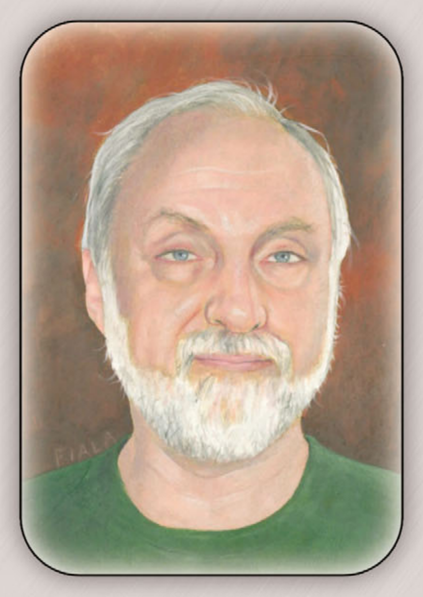
Windows 2.0 debuted in 1987. Little had changed on the front end, aside from the significant addition of overlapping windows—though this resulted in a "look and feel" suit by Apple against Microsoft, alleging that the latter had violated copyright by making a GUI. The suit was unsuccessful, and the irony of Apple suing to protect the GUI concept, which Steve Jobs had been introduced to by Xerox's Star GUI back in 1979, was lost on no one.

There was also some increased support for Windows 2.0 from third-party developers, including the first Windows versions of CorelDraw and PageMaker, as well as the first appearance of Microsoft's own Word and Excel. More important to the future of this GUI were the introduction soon afterward of Windows/286 and Windows/386. The latter in particular included a protected-mode kernel, permitting genuine parallel multitasking, as opposed to time-sharing. There was no virtual memory through disk allocation, however, so no swapping to disk if you ran out of RAM. Need more memory? Buy it. On the positive side, you could run DOS-based text programs in a window, though not effectively. It is perhaps unsurprising that Windows never really succeeded in handling DOS windows well until it did away with DOS.

The defining moment for Windows was its 3.0 release, in 1990. Several standard Windows features first appeared at that time, including Program Manager, replacing the previous launch-from-file-manager—though a new file manager showed up, too, that would evolve over time into Windows Explorer. The 256-color MCGA mode was supported, as well as 16-color VGA. A macro recorder was included, though it would later be phased out. This was the first version of Windows that furnished an operating system (albeit one that ran on top of another operating system, DOS) and a broad suite of development tools, such as Platform Builder 3.0. Most importantly of all, Windows 3.0 could run in protected mode. Many companies liked what they saw at this stage of the product, and quite a few applications started selling in dual DOS and Windows-based GUI versions.

As for Windows 3.1, it was released in 1992 to considerable fanfare, and sold more than a million units in its first three months of availability. Improvements included TrueType scalable fonts, Object Linking and Embedding, API multimedia and networking support, and the beginnings of Windows' Registry system. At roughly the same time, Windows 3.1 for Workgroups supplied such features as support for P2P networking, print manager improvements, and Server Message Block file sharing utilizing both IPX and NETBEUI protocols.

It was a good times for Windows—arguably the best it ever had, before domestic and foreign courts, permatemps and blacklists, Linux, and Firefox all began to slowly erode its hegemony. Not that Microsoft is doing poorly today, but the three-year period between April 2004 and March 2007 alone saw $300 million in legal fees and over $4 billion paid out in litigation settlements. By comparison, the early 1990s were halcyon days. Microsoft had the world at its feet, and was not above sharply giving it the toe of its boot. But however matters evolved, the achievement of Windows remains a story of popular software parlayed into a cutting-edge empire. ▲



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

Wax nostalgic with Barry at
barry@cpumag.com

Software Tips & Projects

Second Things Second

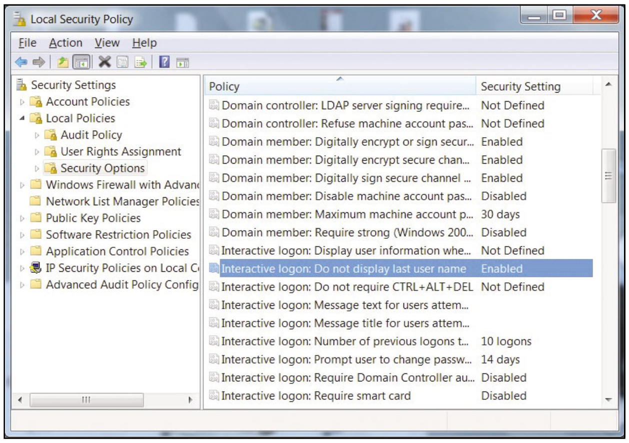
Now that many of you have grown accustomed to Windows 7 and performed some of the early tweaks, let's drill in further and start aligning with your personal needs. Here then is our next tier of tweaks and tips for your post-Vista Windows experience. Let's start with some Win7 features you may *not* want. And one final advisory note for those of you still pondering the upgrade to Win7: We suggest you download and run the Windows 7 Upgrade Advisor from Microsoft.com in order to get a good feel for the drivers and software the upgrade will affect.

Anonymize The Logon

If you are a stickler for security, or just want to keep your PC activities a little more private, then you may object to the way Win7 displays the full array of your user accounts at login. User account names can give people clues to whom and what is on your machine. To add a layer of anonymity, try turning off the display of the last user who logged onto the PC. This will instead present a blank user icon and an open login field.

The easy way to do this on Win7 Professional or higher is to type **local security policy** in the Search field and open that application. Under Local Policies, open Security Options. In the right-hand pane, double-click Interactive Logon: Do Not Display Last User Name and toggle Enabled. Click OK and close the windows. When you reboot, you will get the anonymous logon.

We used Win7 Ultimate for these tweaks, which gives the user full access to the Policy Editors. Some other versions of Win7 will not show the Local Security Policy editor referenced earlier. In that case, you'll need to dig into the Registry to make this change. Locate the key in HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System and double-click the Value name "dontdisplaylastusername." Change the Value data from 0 to 1.


Local Security Policy
File
Action
View
Help
Security Settings
Account Policies
Local Policies
Audit Policy
User Rights Assignment
Security Options
Windows Firewall with Advanc
Network List Manager Policies
Public Key Policies
Software Restriction Policies
Application Control Policies
IP Security Policies on Local C
Advanced Audit Policy Config

Policy	Security Setting
Domain controller: LDAP server signing require...	Not Defined
Domain controller: Refuse machine account pas...	Not Defined
Domain member: Digitally encrypt or sign secur...	Enabled
Domain member: Digitally encrypt secure chan...	Enabled
Domain member: Digitally sign secure channel ...	Enabled
Domain member: Disable machine account pas...	Disabled
Domain member: Maximum machine account p...	30 days
Domain member: Require strong (Windows 200...	Disabled
Interactive logon: Display user information whe...	Not Defined
Interactive logon: Do not display last user name	Enabled
Interactive logon: Do not require CTRL+ALT+DEL	Not Defined
Interactive logon: Message text for users attem...	
Interactive logon: Message title for users attem...	
Interactive logon: Number of previous logons t...	10 logons
Interactive logon: Prompt user to change passw...	14 days
Interactive logon: Require Domain Controller au...	Disabled
Interactive logon: Require smart card	Disabled

The Local Security Policy tool (available in Windows 7 Pro and above) lets you secure your login so that usernames are not visible at startup.

By the way, this Registry tweak is available in Vista.

Disable Jump Lists

The Jump List feature lets you right-click a Taskbar program icon to open the most recent or most frequently accessed files or features in the application. For privacy reasons, or just to clear clutter, you may want to disable this feature. To do so, right-click the Taskbar and open the Properties window. Click the Start Menu tab and uncheck the box for Store And Display Recently Opened Items In The Start Menu And The Taskbar." Once you've disabled Jump Lists, right-clicking a Taskbar program will only offer the most basic program options; it won't display your usage history.

Master The Taskbar

Yes, we like the new and improved Taskbar, but it can eat up a fair amount of screen real estate on our 13-inch laptops. Right-click the Taskbar to bring up Properties, then check the Use Small Icons box to shrink the icons and the Taskbar.

Another option worth considering is adjusting how the Taskbar combines multiple instances of the same program. The default behavior for Win7 is to have a single icon on the Taskbar represent all open instances of a program; mousing over the icon reveals the multiple windows. The Taskbar buttons drop-down menu lets you force the Taskbar to show separate icons for each open window of a program or to combine them only when the Taskbar is full.

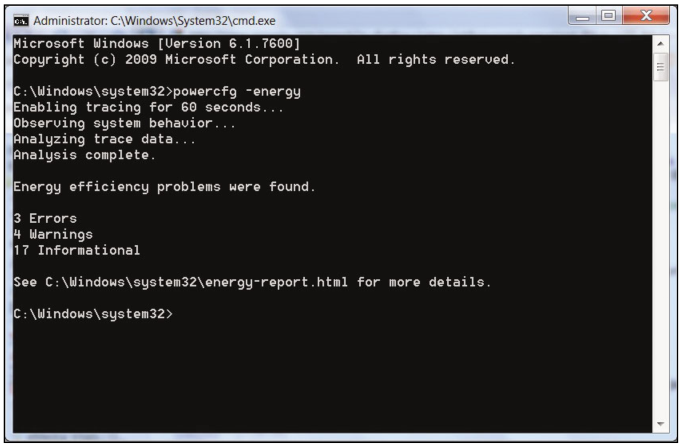
Speaking of Taskbar alterations, many Win7 users don't realize they now have much greater control over the System Tray on the lower-right side of the screen. First, you can rearrange the lineup here the same way you would on the Taskbar, by dragging and dropping your icons around. You can also drag an icon from the System Tray to the top of the Desktop to see a new pop-up box where you can keep some of these icons out of view but accessible by clicking the Up arrow that now appears to the left of the System Tray. If you click the Customize links in this new pop-up window, you will get granular control over the ways in which items such as Network, Power, Volume, and the like appear on the Tray and when they display notifications.

Add A Flip 3D Shortcut

The Flip 3D effect that many of us liked about Vista is still present in Win7 (Win-TAB), but you can also create a Taskbar shortcut that lets you call it up with the mouse. First, you need to create a new shortcut. Right-click open space on the Desktop, point to New, and click Shortcut. In the next window, which asks for a command location, type **RunDll32 DwmApi #105** and click Next. In the next window, name your shortcut "Flip3D" and click Finish. The shortcut will appear on the Desktop with a nondescript icon. To change the icon, right-click the shortcut and open the Properties window. Click Change Icon and click Browse. Navigate to Explorer.exe in your Windows folder. You should see an icon that appears to have the Flip 3D effect. We found it in the third row down, second from the right. Highlight it and click OK. Click OK on your Properties window. Now simply drag and drop the shortcut onto your Taskbar. Again, this same tip also applies to Vista.

Get Your Power Profile

There's a cool way for advanced tinkerers to drill deep into a laptop's power consumption under Win7. Here is how to create a detailed "Power Efficiency Diagnostics Report" from the OS. Type **cmd** in the Search box to launch the cmd.exe command-line program. Right-click the item and click Run As Administrator. At the command prompt, type **powercfg –energy**. When you press ENTER, expect to see the message "Enabling tracing for 60 seconds . . . ." At the end of the process you will receive a brief listing of "Energy efficiency problems found," but it won't give you any details. However, the program has created a more detailed report that you will find in a file named "energy-report.html"; you can find a path to the file after the program runs. Here you will find some fascinating items. In our case, for example, Win7 discovered that the laptop battery's fitness was greatly diminished and had recharged only to 40% of its designed capacity. Likewise, it identifies programs that are running in background and how they are utilizing the CPU. This will give you greater insight into the right power management settings for your laptop. ▲



```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Windows\system32>powercfg -energy
Enabling tracing for 60 seconds...
Observing system behavior...
Analyzing trace data...
Analysis complete.

Energy efficiency problems were found.

3 Errors
4 Warnings
17 Informational

See C:\Windows\system32\energy-report.html for more details.

C:\Windows\system32>
```

This cool command-line tool will run a diagnostics on your laptop's power profile.

by Steve Smith

Windows Tip Of The Month

For IT managers at large and small firms, upgrading a fleet of PCs can be daunting, especially if you need to ensure it works well with all of your legacy machines and software. Apparently, Microsoft really wants your business, so it created a Windows 7 Enterprise 90-day trial at its TechNet site. The program lets managers download and test the OS (equivalent to the Ultimate version) for three months. There are big caveats. This trial is not for the feint of heart. After 90 days, the OS will shut down after an hour of use. If you elect to purchase Win7, you will need to do a fresh install of the OS. Still, if you are on the fence about upgrading your office, this is one way to give Win7 a test drive in your office.

Registry Tip Of The Month

When you load Regedit, the program actually consults several massive files in Windows. When you try to search for keys or values for some of the hacks we describe each month, the process can be painfully slow. Advanced editors often have to look for multiple instances of the same item. An easy way to accelerate Regedit searches considerably is to deselect the irrelevant items in Regedit. Press CTRL-F to bring up the Find box. If you are looking for a Value name (which would be in the right-hand pane) then uncheck the Keys and Data boxes to run your search. Likewise, if you are looking for a Key, uncheck Values and Data boxes. Searches should be much faster. Be forewarned however, that the Find box will retain these search filter settings for subsequent searches, even if you restart Regedit.

Infinite Loop

Secondhand Smoke Is Hazardous To Your Mac's Warranty

Let's be frank: Your MacBook could really care less if you lit up before working on your latest iMovie project. The Apple tech who you take your smoky system to when it goes on the fritz? Well, she'll be less inclined, at least if she's following Apple's warranty policy. At least two Mac owners reported that Apple refused to honor their warranties after finding the systems had become contaminated with cigarette smoke. Both even attempted to contact The Steve for assistance, only to find their requests snuffed out.

Source: consumerist.com/5408885/smoking-near-apple-computers-creates-biohazard-voids-warranty

Warm Up To Penguins

The Sound Of Open Source

For the most part, everybody has downloaded music (legally, of course). Many of us haven't purchased a physical CD in ages. And no service has popularized buying music online as much as Apple's iTunes.

In iTunes' early days, buying music from the iTunes Store meant playing it with iTunes (or on an iPod). Competition from Napster, Rhapsody, Zune, Amazon MP3, etc., and the music industry's acceptance of songs free of DRM have opened the doors for a host of applications that will manage your music, along with other media, however. The digital music management software landscape is far more diverse now than it was eight years ago.

Because of Windows' and Mac OS' market shares, the list of available media managers for these operating systems is undoubtedly longer than it is for Linux. But don't think that Linux's smaller user base means the stuff that is available is less than capable. Quite the opposite is true, in fact. Linux users no longer expect to "make do" with what's available; many expect the same features as the programs on other platforms. As a result, the programs you use to manage your MP3s and MP3 player in Linux are just as capable as those for other platforms.

Make A Connection

Although most devices can be hooked up through a USB port, some require special components to fully utilize them. Because of the comparatively small number of Linux users, few hardware vendors write drivers specifically for Linux. This is especially true for hardware Microsoft or Apple manufactures, because Linux directly competes against their operating systems.

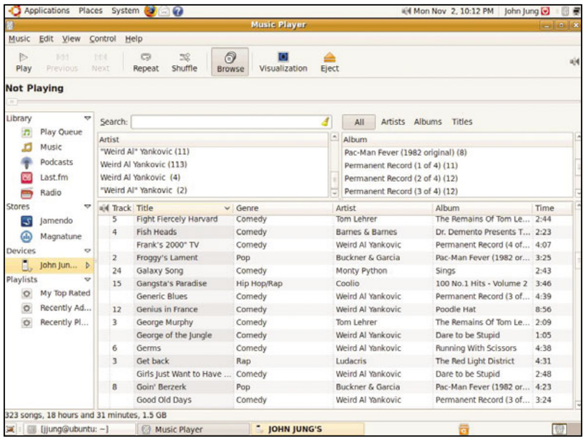
As a result, one of the biggest issues affecting MP3 management programs on Linux is device connectivity. Although you may be able to use a particular program in Linux to manage the content of a given device, you may not have as much control as you like. For example, some content on Zune devices may not be completely accessible. Similarly, not all of the latest features of the latest iPods are supported by all programs on Linux.

Ultimately, if you're looking to manage your portable device's MP3 library, there are lots of options for Linux. However, you'll have to accept that some of the advanced features of your device may not be available. This is largely due to a decision by the vendor to not support Linux.

Rhythmbox Is Gonna Get You

Rhythmbox (projects.gnome.org/rhythmbox) is one of the oldest music management programs available, and its interface is inspired by Apple's iTunes. The Sources pane, which is the leftmost pane, contains the various forms of audio entertainment available, including your music library, podcasts, and some free online radio stations. If you're a Last.fm subscriber, you can also add your account information to access your personalized radio.

Rhythmbox also lets you access two of the lesser-known online music stores: Jamendo (www.jamendo.com/en) and Magnatune (magnatune.com). Neither can be confused with the iTunes Store, but each takes a different approach to offering legal music downloads. Jamendo uses a business model similar to that of software distributed as freeware: The music available for download is completely free, but if you like it, you're asked to make a donation to the artist. Naturally, your support of the artist lets her produce more of the songs that you want piping through your headphones.



Track	Title	Genre	Artist	Album	Time
5	Fight Fiercely Harvard	Comedy	Tom Lehrer	The Remains Of Tom Le...	2:44
4	Fish Heads	Comedy	Barnes & Barnes	Dr. Demento Presents T...	2:23
	Frank's 2000" TV	Comedy	Weird Al Yankovic	Permanent Record (4 of...	4:07
2	Froggy's Lament	Pop	Buckner & Garcia	Pac-Man Fever (1982 or...	3:25
24	Galaxy Song	Comedy	Monty Python	Sings	2:43
15	Gangsta's Paradise	Hip Hop/Rap	Coolio	100 No.1 Hits - Volume 2	3:46
	Generic Blues	Comedy	Weird Al Yankovic	Permanent Record (3 of...	4:39
12	Genius in France	Comedy	Weird Al Yankovic	Poodle Hat	8:56
3	George Murphy	Comedy	Tom Lehrer	The Remains Of Tom Le...	2:09
	George of the Jungle	Comedy	Weird Al Yankovic	Dare to be Stupid	1:05
6	Germs	Comedy	Weird Al Yankovic	Running With Scissors	4:38
3	Get back	Rap	Ludacris	The Red Light District	4:31
	Girls Just Want to Have ...	Comedy	Weird Al Yankovic	Dare to be Stupid	2:48
8	Goin' Berzerk	Pop	Buckner & Garcia	Pac-Man Fever (1982 or...	4:23
	Good Old Days	Comedy	Weird Al Yankovic	Permanent Record (3 of...	3:24

323 songs, 18 hours and 31 minutes, 1.5 GB

Rhythmbox gives you a familiar interface to manage your MP3s.

Magnatune is a small, independent record label that also sells downloads from its library of music. Its business model borrows elements from both Jamendo and traditional online music stores. What makes Magnatune different from other online vendors is that you decide how much you want to pay—between $5 and $18—for the CD. If you prefer to have the physical disc, you have to pay for shipping. So although you aren't forced to pay a regular music store's mandated price for an album, music you download from Magnatune isn't free, either.

Rhythmbox also supports a number of portable media players, such as iPods, players that use Microsoft's MTP (Media Transfer Protocol), and others. Everyone is familiar with iPods, but most people may not realize the prevalence of MTP devices. Examples include certain Creative Zen products; mobile phones from Motorola, Nokia, and Sony Ericsson; and even some digital cameras.

Just plug in your device to one of your system's USB ports, and it should appear on the left, as well. You can use Rhythmbox to manage the songs and playlist(s) on your portable device, as you'd expect. It even has a toolbar at the top that helps you quickly and easily find music by the string you specify. And a given search applies to the part of the library that's currently selected. So if you have the Radio category selected, your search will only apply to items in there.

Amarok Impresses

Amarok (amarok.kde.org) is another popular and established music management program, and its capabilities have only increased through the years. It features an interface that is at the same time similar to and quite different from the familiar iTunes. Your categories for sources of media are located on the left and your current playlist is shown on the right. By default, the middle is an empty space that actually consists of four Pages. These Pages are groupings of different Amarok applets that expand its functionality. Some examples of these applets include a video applet that shows videos related to the song and a lyrics applet that gets the lyrics for the current song.

Along with being preconfigured for Jamendo and Magnatune like Rhythmbox, Amarok also comes ready to use with a number of other forms of online audio entertainment. You can access the OPML directory of podcasts. It also comes ready to work with two more rather unusual collections of online audio content: LibriVox (www.librivox.org) and CoolStreams (www.coolstreams.com).

LibriVox is a collection of free, volunteer-read audio books from the public domain. The collection necessarily deals with public domain books to avoid copyright and royalty issues, so the books available on LibriVox usually have been published before 1923; don't expect to get the latest *New York Times* bestseller. Still, if you want to brush up on the classics, this isn't a bad way of going through a book without actually reading it.

CoolStreams, a nonprofit Internet radio station, is another unique provider of online audio entertainment. Because it's a nonprofit, its subscriptions are actually recurring donations. So you sign up for a membership with recurring amounts that range from $1.79 a month up to $150 a year. For subscriptions over $34.95, you also receive an extra CD full of premium music. During that subscription period, you can listen to Cool Streams' Programs On Demand, hosted radio programs, and continuous sets of songs of particular music genres.

In Amarok, when you double-click the media of your choice on the left, it's automatically appended to your playlist. If you want to rearrange the songs in the playlist, just click and drag an entry from its current location to its new position in the playlist. You can also drag a song from the source on the left to the playlist on the right.

Amarok supports a comparable set of devices, such as iPods, MTP-enabled devices, and a handful of others. As you expect, when you connect your portable media device, it'll show up under the Collections category on the left-hand side. Both Rhythmbox and Amarok are quite capable portable music player management programs.

Stride For Stride

It used to be that there was some lag time from when average user programs available for other platforms became available on Linux. Even today, there are classes of programs, such as games and multimedia applications, that are somewhat less powerful on Linux than on other platforms.

But when it comes to managing your portable MP3 player, Linux is in step with the other platforms. Rhythmbox and Aramok are two fine examples of Linux apps that are on par with similar programs for other OSes. Although not all MP3 players may work on Linux, certainly the most popular ones do. ▲

by John Jung

Infinite Loop

Pac-Man + Roombas = Awesome

Why would anyone use a Roomba for its appointed task after witnessing what a group of enterprising programmers did with five Roombas and a lot of spare time? It's a question we can't answer, because this Pac-Roomba setup, complete with autonomous ghost Roombas programmed to hunt down our hero (and flee when Pac-Roomba devours a power pellet) is totally rad. It's a good thing this project's Web page (pacman.elstonj.com) is packed with photos and videos, because our crude English language fails to appropriately illustrate how slick this hack is.

Source: www.engadget.com/2009/11/09/autonomous-roombas-do-pac-man-right-video

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MICRO CENTER online
www.MicroCenter.com

by Mike Magee

AMD Talks Up Its Fusion Futures

Just a few days before writing this column, AMD and Intel settled their legal differences, with the smaller company collecting $1.25 billion and signing an agreement that it hopes will guarantee it room to grow its market share in the CPU business. Sweetness and light reigns.

Well, not quite, because it was obvious from the rather testy nature of an Intel Webcast that its resolution to compete against AMD is greater than ever, because of the settlement. And just a week before that settlement came, I was in AMD's Lone Star campus in Austin, listening to how the company believes its Fusion technology will clean up, a couple of years down the line.

Fusion won't really begin to happen until 2011, according to Joe Macri, the chief technology officer at AMD. But when it does, he told me, it's really going to bring some major performance boosts to AMD architecture.

The key to Fusion's success, he believes, is the high bandwidth you create by putting a CPU and a GPU together. "On a single die, you can do many things that two chips talking to each other on a narrow channel really can't do," Macri says.

AMD has coined a new acronym for a Fusion chip: the APU, or accelerated processor unit. Macri is obviously fired up by it, going so far as to describe a Fusion APU as "a supercomputer on a chip."

AMD plans to proliferate Fusion on a set of devices from handheld machines to supercomputers.

Intel doesn't like this kind of attitude very much at all. While Larrabee, the company's master plan for multicores, is well underway, it has some fundamental differences from Fusion. And then there's the channel, or route to market—a well-trodden path for AMD, but one that Intel has yet to master. Macri was rather dismissive about Larrabee. Well, he would be, wouldn't he?

AMD has plenty happening between now and the dawn of Fusion. Sometime in the first half of 2010, it will release a notebook chip code-named Danube, a 45-nanometer quad-core chip that will give many hours of battery life and will support DX11 discrete graphics. Around about the same time, it will release an ultrathin, 45nm dual-core CPU that reportedly provides more than seven hours of idle battery life, assuming there's a 6-cell Li-Ion battery plugged in.

As for Fusion, it's currently slated for two notebook platforms, code-named Sabine and Brazos. The first uses the Llano APU, with four cores, 4MB of cache, and supporting DDR3. Brazos uses the Ontario APU, with two cores, a 1MB cache, and supporting DDR3. AMD is clearly not a believer in the large memory caches that Intel is so fond of; Macri believes that you can achieve similar results using different design methods.

We asked about AMD's ability to match Intel on process technology, through its spun-off partner GlobalFoundries. Right now, Intel has a clear lead over GlobalFoundries; it's prepping 32nm CPUs while AMD remains on 45nm microprocessors. The settlement between AMD and Intel allows for GlobalFoundries to be divested from AMD, and there's a separate agreement that allows AMD's former fab unit to manufacture x86 technology, too.

Macri has some interesting thoughts on GlobalFoundries. He thinks that by 2011 it will be in a position to thoroughly match and even surpass Intel's manufacturing ability. We're not at all sure that will be the case, as Intel is committed to moving on for just as long as Moore's Law is viable. But GlobalFoundries is in a far better position now than it was when it first left AMD's fold; it will merge with Singapore fab Chartered Semiconductor and has access to a whole set of technologies because of its recent deal with ARM. Further, it is part of a worldwide technology-sharing consortium that includes IBM, STMicroelectronics, and several large Japanese firms.

AMD seems confident it can execute on its Fusion plans. If it does, we're going to see some most interesting "chip wars" during 2011. ▲

Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

Send rumours to "Mad Mike" Magee at mike@cpumag.com

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Technically Speaking

An Interview With The New America Foundation's Sascha Meinrath

Sascha Meinrath is the Research Director of the New America Foundation's Wireless Future Program, and coordinates the Foundation's Open Technology Initiative. He is a well-known expert on community wireless networks, municipal broadband, and telecommunications policy. He blogs regularly at www.saschameinrath.com.

by Barry Brenesal

CPU: The FCC has recently published its draft rules for an issue of great interest to the Web community, net neutrality. Two commissioners dissented in part, but it appears that the pro-neutrality faction has scored a point. Could you briefly sum up for us what net neutrality means?

Meinrath: Net neutrality fundamentally is the notion that the medium of transport—in this case, the Internet—should be a neutral medium. All data should be treated equitably as it moves across this system. This really boils down to, do the users of the network control the content, or do the providers of that network control the content? It's much the same as an entity who owns a road not being allowed to tell you what color of car you can or cannot drive. What drew this to the fore was Comcast's decision to block peer-to-peer communications, such as BitTorrent, which if you know the service, is used for everything from file sharing to MP3s to photos uploaded by NASA.

CPU: Somebody is bound to point out that some roads forbid the transportation of toxic materials. What's to prevent providers from saying, "Anybody could use a net-neutral network to pass along porn or stolen credit card numbers?"

Meinrath: We must allow reasonable network management. The same way we wouldn't want people zooming through rush hour traffic with radioactive loads, we also don't want the fraud that can occur through misuse of the Internet. Everyone is agreed, pro network neutrality and con, that there needs to be checks and balances to prevent the illegal activities. On the other hand, these powers need to be limited, otherwise we'll end up with providers asking themselves, "What sort of additional tolls can I extract from my users?"

CPU: Now the FCC rules that are being promulgated don't seem very controversial. As an example, and this really is typical, "Consumers are entitled to access the lawful Internet content of their choice." Not very heady stuff, surely?

Meinrath: Correct. These are really straightforward, common-sense, no-brainer ideas. But you can easily imagine a provider thinking, "If I can commoditize scarcity and charge additional fees for people to acquire prioritized services, then I might be able to earn a higher profit, and then I can defer investing in additional capacity and providing everybody with a better service." What we're trying to point out is that providers can still make a profit. They can still have myriad business models. But we want to put some fundamental parameters in place on what you can and can't do when it comes to the network. Because we want a more level playing environment, not just for innovation, but to provide affordable broadband access. Without these parameters, businesses have tended to run amok, as we've recently seen so devastatingly with the financial and banking industry.

CPU: The providers appear to be relying upon some arguments that brought forth remarkable criticisms from FCC Commissioner Michael Copps. He mentioned "Chicken Littles running around claiming the sky is falling." Copps also referred with contempt to net neutrality opposition using lies designed to provoke mob fear—such as claims it would prevent 911 emergency calls, keep ISPs from implementing any means of easing network congestion, and destroy measures designed to make Homeland Security effective. Who is saying these things, and who's their target?

Meinrath: The lobbyists for the telcos are out there saying these things. They're meant to impress those who absolutely do not know the issues, do not understand the technology, and have not read the proposals. I will say they are lies, because nobody on the public interest side has ever remarked, "We don't want any sort

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of traffic management on the Web." What we have said is, "How do we protect the rights of consumers?" I've encountered some pretty outrageous stuff: network neutrality will cause spam, it will cause more phishing schemes, it will harm minorities and small businesses, or it will prevent law enforcement from doing its job. All of these claims are ludicrous.

CPU: My understanding was that the FCC rules clause about "reasonable use" was actually meant to address viruses, spam, child porn, copyright infringement, and so on. Aren't these the same issues lobbyists claim the proposed FCC rules on net neutrality would promote?

Meinrath: Absolutely. The irony of all this is that we had de facto network neutrality for most of the Internet's history. It's only been recently that we've seen a number of examples where companies have begun violating those norms. Because of these repeated violations, we've now had to create regulations to prevent future malfeasance.

> The people that are against the authority of the FCC were the same ones arguing that the FCC did have authority when they decided against regulation. —Sascha Meinrath

CPU: Let me bring up another one of the charges, laid at the feet of net neutrality advocates. It's been expressed by some curiously disparate viewpoints: the two dissenting commissioners on the FCC and at least a few widely respected progressive organizations. They believe that the FCC as an agency does not have the authority to make such rulings. I understand Comcast is also making this case before the federal courts.

Meinrath: The people that are against the authority of the FCC were the same ones arguing that the FCC did have authority when they decided against regulation. The Brand X Supreme Court Decision of 2005 was settled in favor of the telco incumbents, who argued then, successfully, before the Court that the FCC had the authority to make decisions over telecommunications. So for them to turn around now that a decision is coming down which they don't like, and say, "No, the FCC only has authority over decisions we like," is ludicrous.

CPU: What sort of challenges, legal and otherwise, are these rules set to face?

Meinrath: There will be, as there always are, three battlefields. The first is at the FCC, and if and when that's won, you always get a court challenge. Then you will also get a challenge on the Hill. Because the telcos are going to try and roll back the decision of the FCC, if they don't like it, by whatever means they can.

This is exactly what happened with low-powered FM radio. The FCC did years of research and analysis. They commissioned a multimillion dollar study by Mitre Corporation—who said at one point they were actually stopping the study since it didn't make sense to spend more taxpayer dollars, as it was completely clear that low-powered FM radio would not cause harmful interference to high-powered radio. The FCC ruled in favor of this, and the NAB, the National Association of Broadcasters, lobbied for a Congressional law to overrule the FCC. That law was passed.

Now eight years later, hundreds of LPFM stations did get through in spite of this Congressional ban, and there's been no harmful interference to high-powered FM radio. Guess what? All the physics and engineering was correct. But now we still have to overturn a really bad law so that we can have LPFM stations in many more communities across the United States.

CPU: Previous FCC Chairman Kevin Martin has come under some pretty hefty criticism for not dealing expeditiously with the issue of net neutrality. Do you think that was fair?

Meinrath: Many of these issues have been pending in one form or another before the FCC for years. The FCC has systematically refused to address them and come to a final decision, but now we're at a place where the concerns that we had a half decade ago have turned into really problematic corporate behavior, in devastating proportions. For example, AT&T designed a multi-tens-of-billions-of-dollars infrastructure whereby if you want to watch HD television, it actually cannibalizes the speed of your Internet. That was a horrible business decision and is terrible for consumers. It was allowed because the FCC did not address the issue of managed services. So yes: the FCC really did a disservice to consumers by not addressing these issues and ameliorating the problems that were being promulgated by regulation not keeping pace with technological innovation.

CPU: Yet it seems you have a good deal of hope for the FCC as it is currently structured.

Meinrath: Because I've worked with or talked with a number of FCC officials. I know what they believe in their heart of hearts, and they want to do the right thing for the public that they serve. I also have a deep-seated concern that under the weight of a $100 million lobbying campaign, even the most stalwart supporters of network neutrality might wither. If nothing else, this is a moment where people's mettle will be tested.

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Subscribers can read bonus content with Sascha Meinrath
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by Anastasia Poland

Under Development

A Peek At What's Brewing In The Laboratory

New Brain-to-Brain Communication Lets You Speak Your Mind

Dr. Christopher James, of the University of Southampton in the UK, works with a subject in his B2B (brain-to-brain) communication research.

Telepathic communication provides plenty of grist for the mill for believers and skeptics alike. Believer or not, there are those moments of knowing something about another that just cannot be explained.

That said, scientists at the University of Southampton's Institute of Sound and Vibration Research have a very clear explanation for their telepathic communication work: They've managed to facilitate B2B (brain-to-brain) communication with the help of a computer.

Dr. Christopher James, lead researcher, explains his discoveries: "B2B uses the process of BCI (brain-computer interfacing) to translate electrical activity of the brain as measured at the scalp into a means of communication. Imagined limb movements from one user are digitized, and the information transmitted to a second user."

James set up a subject with scalp electrodes that recorded the brain's electrical activity (known as EEG, or electroencephalography). The subject then envisioned two movements to represent binary digits: The subject thought of moving her left arm to represent 0 and of moving her right arm to represent 1. When these brain impulses were transmitted via an EEG amplifier to a PC and then digitized, the PC converted and transmitted the impulses to LEDs at two frequencies—one for 0 and the other for 1. A second subject (also equipped with scalp electrodes) simply watched the LEDs flash. Those patterns were stored in their visual cortex, to be read by their electrodes and reported back to the PC, where Matlab software and proprietary algorithms by James gleaned the information.

Future work holds some tricky moral issues, says James, because the second subject in his experiment is "just a conduit, a part of the communication system," and isn't conscious of the communication. "The challenge is to come up with a paradigm that will allow the information into the second person's brain such that they are conscious of it, but to do so in as non-invasive a fashion as possible.

Moving forward, James says, "BCI continues to be my major thrust, allowing people with limited to no communication ability to communicate reliably, efficiently, and easily. So, the challenge is to make a system that is fast, affordable, and reliable. Most of my research is towards making robust, intelligent algorithms that can extract the information from few channels with minimal error."

James suggests gaming as a potential use for his work but is more intrigued by the possibility of BCI "games" as rehab for those who've suffered brain injuries or for athletes trying to hone their abilities. ▲

Alzheimer's Clues May Be At Our Fingertips

Scientists at the University of Maryland, led by Lisa Vizer, are hoping that their work will someday help identify early signs of Alzheimer's. To that end, they're focusing on keyboarding, a task that is known to be relatively unique and consistent for each individual over time.

With special keystroke monitoring software, the researchers ran volunteers through several writing exercises to obtain a baseline. After that, the subjects were stressed either cognitively, by performing mental math problems, or physically, with strenuous exercise.

Andrew Sears, co-author of the study, explains that their data analysis focused on typing speed, pauses in typing, unique typing characteristics, as well as content and vocabulary used. The researchers found that subjects who were stressed cognitively showed a greater change in their keyboarding style, noting that subjects began increasingly using the CAPS LOCK while reducing use of the BACKSPACE key. Those who were stressed physically tended to show shifts in their language usage rather than typing habits.

Sears and colleagues are challenged to push their work beyond their recent findings, "which show that short-term stress can lead to changes that we can detect," in order to reach their longer-term goal of identifying age-associated cognitive or physical changes that may lead to Alzheimer's.

The team is now collecting more data from older adults and volunteers with "mild cognitive impairments." Sears explains, "This new data collection will help extend our previous findings. We can see a number of commercial applications of these ideas as they become more refined with our primary interest being in the area of health care." ▲

Luminos Sheds Light On 3D Computing

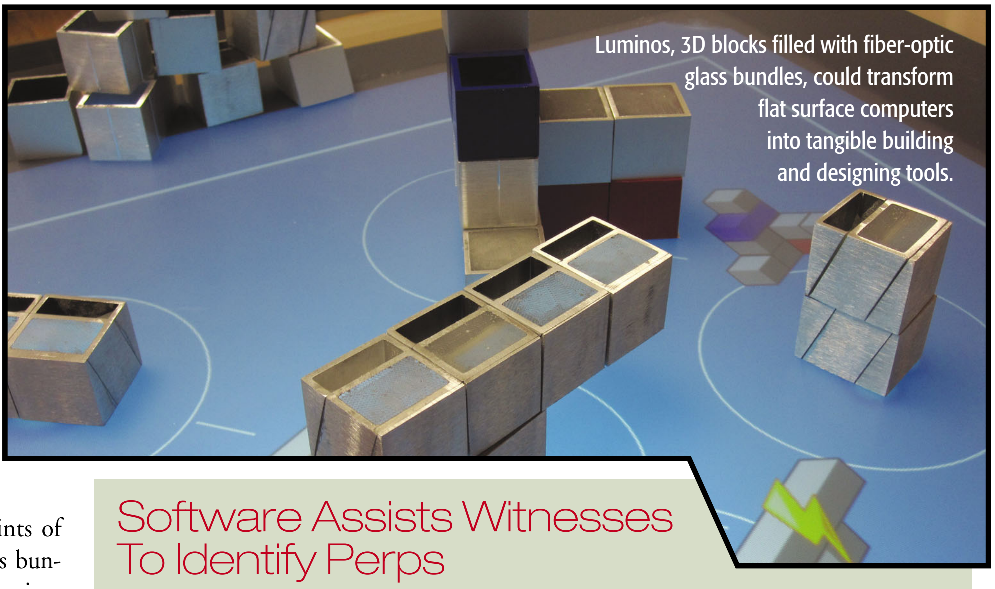
Flash back on playing with building blocks. You know you still harbor a secret love for that primary-colored set of yore. Patrick Baudisch, Torsten Becker, and Frederik Rudeck at Germany's University of Potsdam Hasso Plattner Institute seem to understand your deep, dark secret and have built a new, grown-up set of blocks to satisfy that hankering for nostalgic play.

Dubbed "Luminos," Baudisch's set of building blocks can be used for much more than play. Utilizing Microsoft's Surface tabletop computer (but "would work with any tabletop computer based on diffuse illumination," according to Baudisch), Luminos can create 3D structures up to 10 blocks tall, all of which can be read by the computer via special symbols indicating shape and angled glass fiber bundles contained in the Luminos. Cameras within the computer read the markers (basically, reference points of size and shape) while the optical glass bundles reflect down through each Lumino in a given stack from the markers above.

The team has created three demo apps for the blocks. (Baudisch and his team have also crafted three types of blocks and marker designs.) A construction kit lets a user create 3D structures, which the computer can then review and evaluate. In a checkers game using Luminos, the Luminos sense when other Luminos are on top of them, can gauge what type of block it is, and will give tips on which way to move when they sense a piece hovering over a square. The third app, multidials, is useful for photo processing. One Lumino can be used like a dial (hence the name of the app) for color cast removal, and another can correct color saturation. Two stacked Luminos can "stamp" new images, applying the same corrections. Beyond the fun factor, Baudisch and company are developing Luminos for potential use by architects, engineers, and artists.

There have been plenty of challenges along the way, says Baudisch. "I realized early on that the answer was guiding the light around. We also thought of glass fiber bundles comparably early, but it took us a while to come up with how exactly the fibers had to be used. The other breakthrough was to fabricate our own fiber bundles, with credit to my Master's student Frederik Rudeck."

Because of the cost and rarity of the usage of glass fiber bundles in mainstream electronics (typically used by the military in night-vision goggles and in medical settings for endoscopies), it's difficult for Baudisch to predict when Luminos might hit the market. As the supplies become more readily available, and thus cost-effective, expect Luminos to pop up in stores near you.


Luminos, 3D blocks filled with fiber-optic glass bundles, could transform flat surface computers into tangible building and designing tools.

Software Assists Witnesses To Identify Perps

Because of newly created software from researcher Christopher Solomon of the UK's University of Kent, witnesses to crimes may be able to more accurately identify the perpetrators. Typically, witnesses recall a criminal's face for a sketch artist, but Solomon cites work in the psychology field that indicates humans don't have the most reliable memories for "recalling and describing a face."

Faced, as it were, with such a conundrum, Solomon has crafted facial composite software that complements how our memory functions—that is, we are better at recognition than at recall. A witness gives a basic description, such as "an older, white male with salt-and-pepper hair," and then the software, dubbed EFIT-V system, offers nine faces to choose from.

After the witness chooses best and worst matches, the software, based on what it has "learned" from the witness' choices and special algorithms that subtly shift facial characteristics, progressively changes the features on the faces and then offers nine more faces. This process repeats itself until the witness can confidently identify a face as a suspect. Unlike traditional methods, this software makes it possible to work with witnesses who cannot fully describe who they saw but feel they could recognize the person if they saw them again.

The EFIT-V system is currently being utilized successfully in police departments in the UK, France, Switzerland, and other European countries. Derbyshire police have found that the software helped to produce twice as many positive identifications than usual methods.

University researchers in the United States are now working with the software, and Solomon is looking to find a U.S. partner to commercialize his program for police use here.

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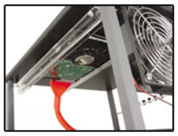

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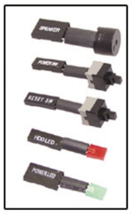

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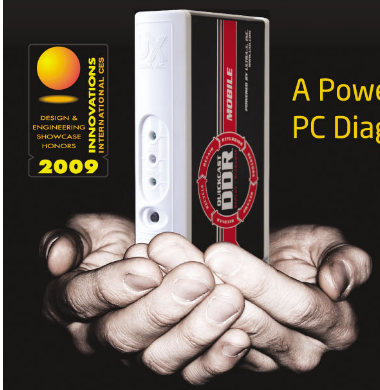

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LANifesto #4 - Clanton, AL
lanifesto.org
Midwest LAN - Darien, WI
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Whempy's LAN Party - Columbus, OH
whempyslan.org

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Lannihilation - Calgary, AB, Canada
www.lannihilation.ca

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Oregon State University, Civil War LAN - Corvallis, OR
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Netwar 17.0 - Omaha, NE
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TempleCON 2010 - Warwick, RI
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Carolina Games Summit - North Carolina
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LANified!: The Second Decade - Calgary, AB, Canada
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TigerLAN 21 - Hays, KS
tigerlan.net

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MegaCon - Orlando, FL
www.megaconvention.com/view/gaming

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Massive LAN - Hamburg, NY
www.massivelan.com

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ClanUSEast 2010 - Laughlintown, PA
www.clanuseast.com

07.10.10

Peace, Love, and Rockets 18 - Arlington TX
www.peaceloveandrockets.org

07.16.10

SGXLAN - Jacksonville, FL
www.sgxlan.com

10.16.10

TigerLAN 22 - Hays, KS
tigerlan.net

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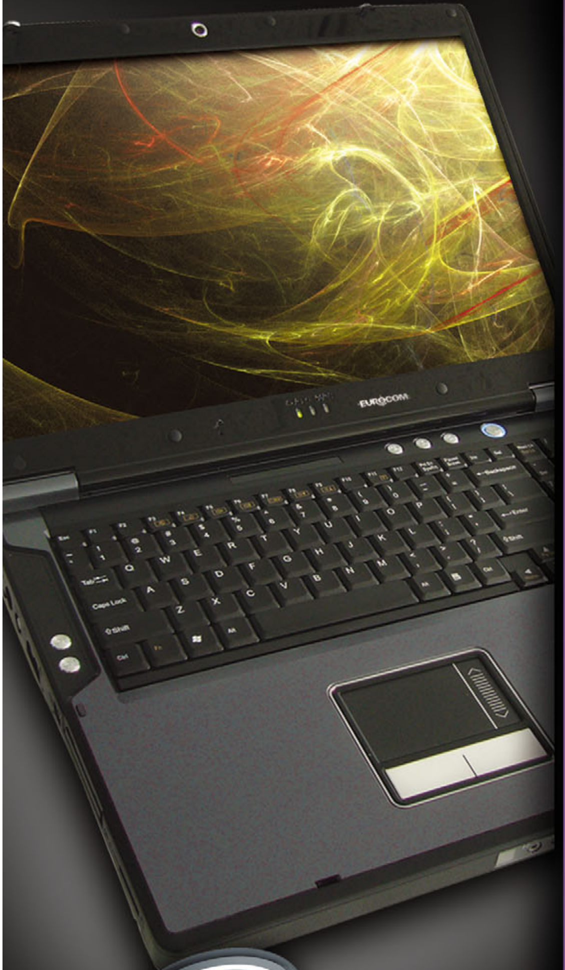

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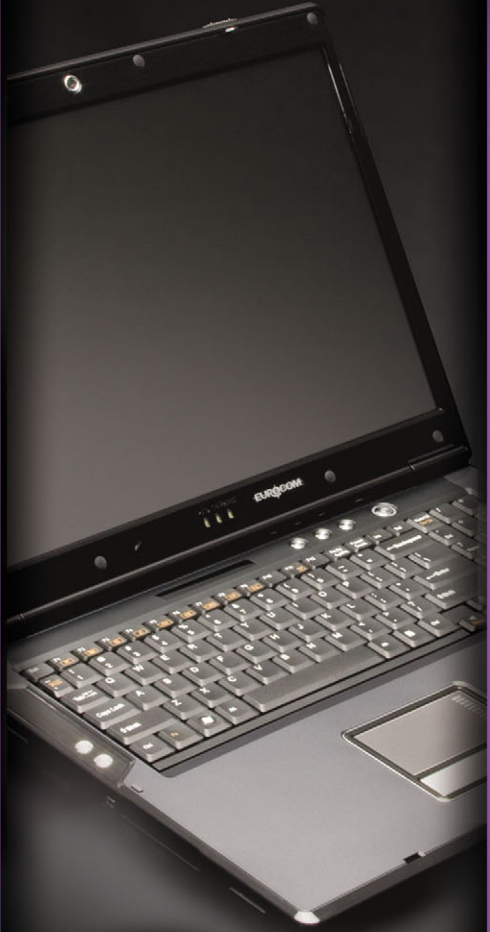

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Q&A With Caterina Fake

Hunch.com's Co-Founder Has A Few Guesses About The Web's Future

If there were a "Queen of Web 2.0," it would be Caterina Fake. Co-founder of Flickr, in 2006, she was named by Time Magazine *as one of the world's 100 most influential people. When Yahoo! snapped up Flickr in 2005, Fake hired on for three years to lead the company's Technology Group. In mid-2009, she resurfaced at the helm of Hunch.com, a new sort of interactive service that might finally offer an alternative to traditional Web searching.*

Q What do "Web 2.0" and "social media" mean to you?

CF I started working in online community stuff way back in the really, really early days, like in Netscape Communities and the Well. These are very 1.0 and even pre-Web. I think there was a little fork in the road when personal publishing started. That was the era of early blogging. I started a blog in 1998 before there was even [blogging] software. Then there were things like social networks. Friendster was the first really successful social network. It got people familiarized with putting their personal profiles online, making a personal identity, contributing to systems, and putting up a photo. That allowed the other social sites to emerge. Friendster plus blogging really lead to what became Web 2.0.

Q What's the core idea behind Hunch?

CF You start with teaching Hunch about yourself by answering a bunch of questions. The average user who starts to teach Hunch answers an average of 140 questions. Basically, Hunch looks at that and then applies it to topics. A topic would be something like "I need a hotel in Los Angeles" or "What new fiction book should I read next?" In Wikipedia, each of those topics has its own article. But Hunch applies that knowledge about you—the kind of person who's a 30-something, urban, skateboarding tax person who went to a two-year college—and then magically says, "We think you'd be interested in this book or recipe or taco bar."

Q A skeptic might wonder if answers aren't being guided by advertising dollars.

CF If we were recommending some company over another, then [we] wouldn't have a very good product. If people thought that Google was only giving paid results, would they trust Google?

Q What is your ultimate vision for Hunch?

CF Hunch should be able to ultimately tell you pretty much anything. It should know that you are you and give the right answer for you. In the end, it should be able to just tell me, "Here's the flight you should take. This is the airline you should go on. Here's the hotel you should stay in. Here [are] some potentially interesting events you might want to attend." It should have Hunches for just about everything tailored for me. It should be like the best-engineered Magic 8-Ball for anything in your life.

Q How do you think social networking will evolve?

CF There are different eras in social interaction online. Things tend to expand and contract in terms of their openness and closed-ness. It's hard to say which period we'll be in at any given time, how much of people's lives will be online, or how much they'll huddle in closely with their clan. I think we've been in a phase of extreme social expansion for the past few years. Around 2003, people were still very much in an older model. For example, Flickr photos are public whereas previous photo sites were not. Their photo albums were only shared amongst a small group of people. So you see different eras of openness.

Q There's a shot in your Flickr photostream showing how employees should use their time. For example, email should only be checked three times per day. This level of discipline seems a bit contrary to the massive timesink normally associated with social media. As a social media architect, how do you reconcile this?

CF One of the issues with social media is that it's totally addictive. You could sit there all day reloading your Twitter stream. It does require a bit of consciousness to get the most out of services like these. Hopefully, things like Twitter are actually fulfilling a positive role for you by finding good links. Hunch is saving you an incredible amount of cognitive overhead. You didn't really want to become an expert in grills and spend three hours researching which grill to buy. [Ideally], these sites are making your life better. All things in moderation. ▲

For bonus content, subscribers can go to www.cpumag.com/cpujan10/q&a.

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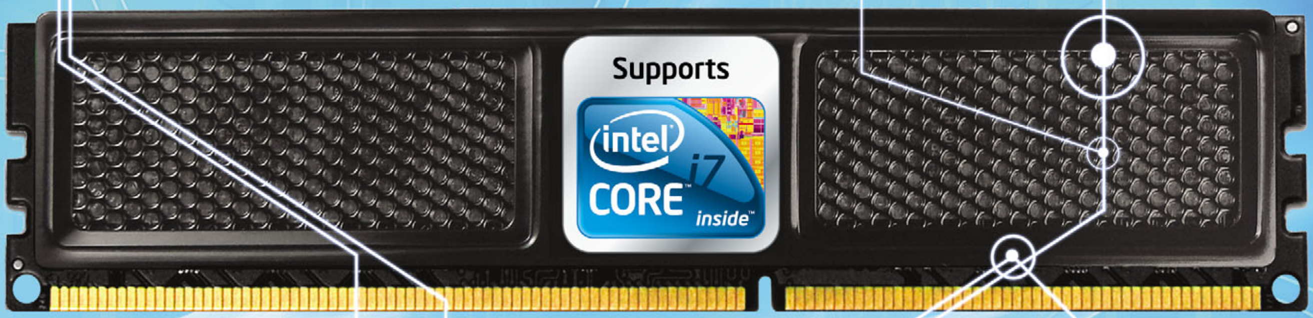
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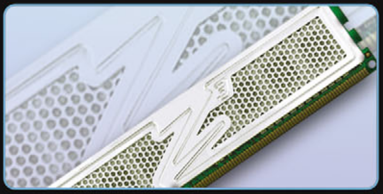

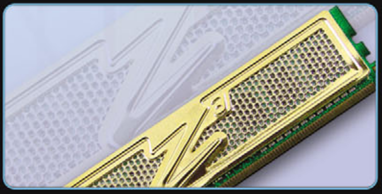

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